

Štěpíte, $U(\text{AsO}_3\text{OH})_2 \cdot 4\text{H}_2\text{O}$, from Jáchymov, Czech Republic: the first natural arsenate of tetravalent uranium

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ABSTRACT

Štěpíte, tetragonal $U(\text{AsO}_3\text{OH})_2(\text{H}_2\text{O})_4$ (IMA 2012-006), is the first natural arsenate of tetravalent uranium. It occurs in the Geschieber vein, Jáchymov ore district, Western Bohemia, Czech Republic, as emerald-green crystalline crusts on altered arsenic. Associated minerals include arsenolite, běhounekite, claudetite, gypsum, kaatialaite, the new mineral vysokýite (IMA 2012-067) and a partially characterized phase with the formula $(\text{H}_3\text{O})_2^+(\text{UO}_2)_2(\text{AsO}_4)_2 \cdot 6\text{H}_2\text{O}$. Štěpíte typically forms tabular crystals with prominent {001} and {010} faces, up to 0.6 mm in size. The crystals have a vitreous lustre and a grey to greenish grey streak. They are brittle with an uneven fracture and a very good cleavage on (001). Their Mohs hardness is about 2. Štěpíte is not fluorescent in either short-wave or long-wave ultraviolet light. It is biaxial (–) with refractive indices (at 590 nm) of $\alpha = 1.636(2)$, $\beta = 1.667(3)$, $\gamma = 1.672(2)$ and $2V_{\text{obs}} < \sim 5^\circ$, anomalous greyish to pale yellow interference colours, and no pleochroism. The composition is as follows: 0.12 Na₂O, 50.19 UO₂, 0.04 SiO₄, 0.09 P₂O₅, 0.93 As₂O₅, 1.95 SO₃, 16.41 H₂O; total 107.90 wt.%, yielding an empirical formula (based on 12 O a.p.f.u.) of $(\text{U}_{1.01}\text{Na}_{0.02})_{\Sigma 1.03}[(\text{AsO}_3\text{OH})_{1.82}(\text{PO}_3\text{OH})_{0.04}(\text{SO}_4)_{0.13}(\text{SiO}_4)_{0.01}]_{\Sigma 2.00} \cdot 4\text{H}_2\text{O}$. Štěpíte is tetragonal, crystallizing in space group $I4_1/acd$, with $a = 10.9894(1)$, $c = 32.9109(6)$ Å, $V = 3974.5(1)$ Å³, $Z = 16$ and $D_{\text{calc}} = 3.90$ g cm⁻³. The six strongest peaks in the X-ray powder-diffraction pattern [d_{obs} in Å (hkl)] are as follows: 8.190(100)(004), 7.008(43)(112), 5.475(18)(200), 4.111(16)(008), 3.395(20)(312,217), 2.1543(25)(419). The crystal structure of štěpíte has been solved from single-crystal X-ray diffraction data by the charge-flipping method and refined to $R_1 = 0.0353$ based on 1434 unique observed reflections, and to $wR_2 = 0.1488$ for all 1523 unique reflections. The crystal structure of štěpíte consists of sheets perpendicular to [001], made up of eight-coordinate uranium atoms and

[†] Zdeněk Mrázek (15th February 1952–15th April 1984) was a well known Czech chemical mineralogist who worked at the Institute of Chemical Technology in Prague. Zdeněk was the first person to investigate štěpíte, more than 30 years ago. He attempted to synthesize $U(\text{AsO}_3\text{OH})_2(\text{H}_2\text{O})_4$ with the aim of comparing the natural and synthetic phases. This research was terminated by his tragic and untimely death. The mineral mrázekite was named in his honour (Řidkošil *et al.*, 1992; Effenberger *et al.*, 1994).

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hydroxyarsenate ‘tetrahedra’. The ligands surrounding the uranium atom consist of six oxygen atoms which belong to the hydroxyarsenate groups and two oxygen atoms which belong to interlayer H₂O molecules. Each UO₈ polyhedron is connected to five other U polyhedra via six AsO₃OH groups. Adjacent electroneutral sheets, of composition [U⁴⁺(AsO₃OH)₂]⁰, are linked by hydrogen bonds involving H₂O molecules in the interlayers and OH groups in the sheets. The new mineral is named in honour of Josef Štěp (1863–1926), a Czech mining engineer and ‘father’ of the world’s first radioactive spa at Jáchymov.

KEYWORDS: štěpíte, new mineral, uranium(IV) bis(hydrogenarsenate) tetrahydrate, crystal structure, chemical composition, oxidation zone, Jáchymov, Czech Republic.

Introduction

URANIUM has two common oxidation states, U⁴⁺ and U⁶⁺, which control its geochemical behaviour: U⁴⁺ minerals are highly insoluble and typically occur as primary phases in ore deposits; U⁶⁺ is relatively mobile in oxidizing environments and the UO₂²⁺ oxycation is characteristic of supergene phases (Langmuir, 1978; Finch and Murakami, 1999). To date, there have been few reports of supergene minerals *sensu stricto*, with U⁴⁺ in their crystal structures. The few that have been described include the mixed-state mineral ianthinite, U⁴⁺(UO₂)₄O₆(OH)₄(H₂O)₄[(H₂O)₅ (Burns *et al.*, 1997); vyacheslavite, U⁴⁺(PO₄)(OH)·nH₂O (Belova *et al.*, 1984); sedovite, U⁴⁺(MoO₄)₂ (Skvortsova and Sidorenko, 1965); lermontovite, U(PO₄)(OH)·7H₂O (Melkov *et al.*, 1983); ningyoite, U_{1-x}Ca_{1-x}REE_{2x}(PO₄)₂(H₂O)_n (where x = 0.1–0.2; n = 1–2) (Muto *et al.*, 1959); and the recently described mineral běhounekite, U⁴⁺(SO₄)₂(H₂O)₄ (Plášil *et al.*, 2011). The first supergene arsenate of tetravalent uranium, štěpíte, from Jáchymov in the Czech Republic is described herein.

Štěpíte was partially described by Ondruš *et al.* (1997), who reported it to be an unnamed new phase with a formula U⁴⁺(HAsO₄)₂·4H₂O; it was subsequently codified as UM1997-20-AsO:HU by Smith and Nickel (2007). Ondruš *et al.* (1997) described its appearance and locality, and noted that its powder-diffraction data corresponded with those of a synthetic phase synthesized by Chernorukov *et al.* (1985).

Štěpíte has been approved by the Commission of New Minerals, Nomenclature and Classification of the International Mineralogical Association (IMA 2012-006). It is named in honour of Ing. Josef Štěp (Fig. 1), a Czech mining engineer who played a leading role in the development of the Jáchymov mines, in the late nineteenth and early twentieth century. Josef

Štěp was born on 6th March 1863 in Mokré near Opočno in Eastern Bohemia. After studying at the Mining Academy in Příbram, and graduating in mining and geology, he obtained (in 1896) the position of ‘Bergmeister’ (i.e. head of the mine) at the Werner shaft (later renamed Rovnost shaft) in the western part of the Jáchymov orefield. He was appointed Head of State Mines and Smelters in St Joachimsthal in 1908. Štěp made significant contributions to uranium ore geology and the study of radioactivity. These include a joint paper with Professor F. Becke of Vienna on the occurrence of uraninite in the Jáchymov mines (Štěp and Becke, 1904). In 1905, using measurement techniques he learned from two visiting physicists (Mache and Meyer, 1905), Štěp discovered highly radioactive springs in the Daniel drainage adit (302 m beneath the surface) between the Červená (Roter Gang) and Radiová (Radium Gang) veins. Highly radioactive water (~38 000 Bq l⁻¹), with a maximum temperature of 10.5°C, issued from the springs. As a result of this discovery and Štěp’s enthusiasm, the world’s first radioactive spa was established in Jáchymov in 1908 (Fig. 2). Josef Štěp was fascinated by radioactivity. He built equipment which detected and measured radiation, including a spinthariscopes and ionization chambers. He conducted many experiments on the radium-bearing compounds manufactured at Jáchymov. At the end of August 1909, the English King, Edward VI, visited the spa and attended a lecture given by Štěp on radium and its properties. In 1921, Štěp became a ministerial counsellor, one of his country’s highest official honours. He died of leukaemia in Příbram on March 24th, 1926, shortly after his retirement.

The type specimen of štěpíte has been deposited in the collections of the Department of Mineralogy and Petrology of the National Museum in Prague, Czech Republic, under catalogue number PIP 7/2011.



FIG. 1. Ing. Josef Štěp in the first guestbook of Jáchymov spa (left) portrayed by Karel Stengel, and at his apartment, wearing a traditional mining officer's uniform (right).



FIG. 2. The opening (in 1908) of the first pipeline which transported radioactive water from Štěp's springs (in the Werner-Rovnost mine) through the Daniel adit (in the picture) to the spa. Josef Štěp is standing second to the left from the left column, wearing a traditional working miner's uniform.

Occurrence

The specimens of štěpíte, described herein, were found in the world-renowned Jáchymov ore district (St Joachimsthal), Krušné hory Mountains, which is located approximately 20 km north of Karlovy Vary in northwest Bohemia, Czech Republic. The Jáchymov ore district provides classic examples of Ag-As-Bi-Co-Ni-U hydrothermal vein type deposits (Ondruš *et al.*, 2003). The ore-bearing veins cut medium-grade metasedimentary rocks of Cambrian to Ordovician age, which surround a Variscan granitic pluton. The majority of the primary ore minerals were deposited from mesothermal fluids during Variscan mineralizing processes. More than 420 minerals have been described from Jáchymov, including an extremely diverse assemblage of supergene minerals (Ondruš *et al.*, 1997, 2003). A brief review of the history of mining, geology and mineralogy of the district is provided by Tvrđý and Plášil (2010).

The type specimens of štěpíte were found on the 10th level of Svornost (formerly 'Einigkeit') mine in the central part of the Jáchymov ore district. They were restricted to a lens of arsenic (containing traces of arsenopyrite, proustite and pyrite) at the intersection of the Geschieber and Geyer veins. The minerals in this orebody had been exposed to a moist environment for more than 40 years and in that time a variety of supergene alteration products had formed. These

include abundant arsenolite, As_2O_3 ; its dimorph claudetite; kaatialaite, $\text{Fe}^{3+}[\text{AsO}_2(\text{OH})_2]_3 \cdot 5\text{H}_2\text{O}$; and localized occurrences of scorodite, $\text{Fe}^{3+}\text{AsO}_4 \cdot 2\text{H}_2\text{O}$; parasymplectite, $\text{Fe}_3^{2+}(\text{AsO}_4)_2 \cdot 8\text{H}_2\text{O}$; micropharmacolite, $\text{Ca}_4\text{Mg}(\text{AsO}_4)_2[\text{AsO}_3(\text{OH})]_2 \cdot 12\text{H}_2\text{O}$; melanterite, $\text{Fe}^{2+}\text{SO}_4 \cdot 7\text{H}_2\text{O}$; and sulfur. Four new uranium minerals occur on the altered surfaces of the arsenic: prismatic green crystals of běhounekite, $\text{U}^{4+}(\text{SO}_4)_2 \cdot 4\text{H}_2\text{O}$ (Plášil *et al.*, 2011); green tabular crystals of štěpíte, $\text{U}^{4+}(\text{AsO}_3\text{OH})_2 \cdot 4\text{H}_2\text{O}$, described herein; pale green needle-like crystals of vysokýite, $\text{U}^{4+}(\text{AsO}_2\text{OH})_4 \cdot 4\text{H}_2\text{O}$ (approved recently by the CNMNC of the IMA as IMA 2012-067); and a partially characterized phase, which occurs as rare pale yellow to greenish powdery aggregates and has a formula $(\text{H}_3\text{O})^+(\text{UO}_2)_2(\text{AsO}_4)_2 \cdot 6\text{H}_2\text{O}$ (authors' unpublished data). As well as the type area, štěpíte has also been found on the fifth level of Svornost mine, also on Geschieber vein, where it is also associated with weathered massive arsenic. A detailed description of the geochemical conditions in which štěpíte crystallizes will be the subject of a separate paper.

Physical and optical properties

Štěpíte occurs in three distinctive morphological variants (types I, II and III) which commonly crystallize in close association. The first of these is as tabular crystals (Figs 3 and 4) with dominant $\{111\}$ and $\{001\}$ faces, up to 0.6 mm across,



FIG. 3. Emerald-green tetragonal crystals of štěpíte coating altered arsenic covered by arsenolite. The field of view is 5 mm; photo P. Škácha.

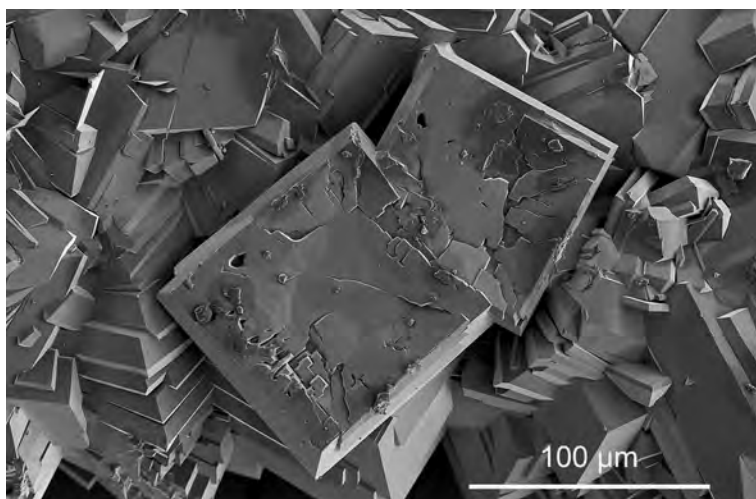


FIG. 4. Backscattered-electron image showing typical type I štěpíte crystals with prominent $\{001\}$ pinacoid faces and smaller $\{111\}$ pyramid faces.

which are commonly intergrown to form aggregates up to 6 mm across. The second morphological variant is as blocky intergrowth crystals (Fig. 5). The least common morphological variant is as minute radiating aggregates of thin platy crystals (Fig. 6), which commonly crystallize on long prismatic crystals of the partially characterized uranyl arsenate described above. All three morphological variants have the same powder XRD pattern and chemical composition.

The Mohs hardness of štěpíte is between 2 and 3. The calculated density based on the empirical formula is 3.90 g cm^{-3} . Štěpíte is not fluorescent

in either short-wave or long-wave ultraviolet light. Its optical properties were measured on bipyramidal crystals (Figs 3 and 4) with perfect cleavage on (001). The largest (emerald green) crystal fragments that were available for study showed no pleochroism. Almost all of the tabular crystals show anomalous birefringence on the 001 plane with greyish to pale yellow interference colours. They are biaxial (–) with very low $2V_{\text{obs}} < \sim 5^\circ$ and principal refractive indices (at 590 nm) of $\alpha = 1.636(2)$, $\beta = 1.667(3)$ and $\gamma = 1.672(2)$ corresponding to a birefringence 0.026. The lack of agreement between the biaxial optical properties and the uniaxial tetragonal symmetry

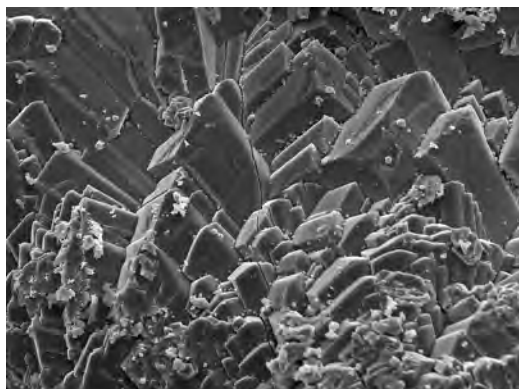


FIG. 5. Backscattered-electron image showing flat blocky crystals of type II štěpíte. The image is $120 \mu\text{m}$ across.

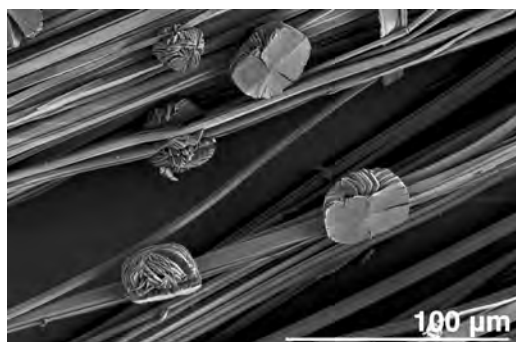


FIG. 6. Backscattered-electron image showing spherical and hemispherical radiating platy type III štěpíte crystal aggregates on long prismatic crystals of an unnamed phase with the formula $U^{4+}[AsO_2(OH)_2]_4(H_2O)_4$.

determined by single-crystal X-ray diffraction studies is intriguing. We have been unable to determine the reasons for this discrepancy; a re-investigation of the diffraction data did not reveal any additional artefacts that may suggest a lowering of symmetry. The Gladstone–Dale compatibility index of -0.052 is ‘good’ in the classification of Mandarino (1981); it may be adversely affected by a relatively unreliable extrapolated k value for UO_2 .

Chemical composition

The composition of štěpíte was determined using a Cameca SX100 electron microprobe operating in wavelength-dispersive spectrometry (WDS) mode at an acceleration voltage of 15 kV, current of 5 nA and 10 μm beam diameter. The following X-ray lines and standards were selected to minimize overlaps: $K\alpha$ lines: Na (albite), Si (sanidine), P (fluorapatite), As (lammerite), S (SrSO_4); $M\beta$ line: U (metallic U). Peak counting times were 10–20 s; background counting times were 50% of those on the peaks. Measured intensities were converted to elemental concentrations using the *PAP* procedure (Pouchou and Pichoir, 1985).

Crystals of štěpíte were found to be chemically homogeneous. The chemical composition obtained by electron-microprobe analysis is listed in Table 1. The empirical formula of štěpíte (based on 12 O a.p.f.u.) is $(\text{U}_{1.01}\text{Na}_{0.02})_{\Sigma 1.03}[(\text{AsO}_3\text{OH})_{1.82}(\text{PO}_3\text{OH})_{0.04}(\text{SO}_4)_{0.13}(\text{SiO}_4)_{0.01}]_{\Sigma 2.00}\cdot 4\text{H}_2\text{O}$ (with the H_2O content calculated on the basis of crystal-structure and thermal analysis). The simplified formula is $\text{U}(\text{AsO}_3\text{OH})_2\cdot 4\text{H}_2\text{O}$, which requires UO_2 45.77, As_2O_5 38.96, H_2O 15.27; total 100.00 wt.%.

The thermogravimetric analysis of štěpíte was conducted on a Stanton-Redcroft Thermobalance TG-750, on a sample mass of 0.667 mg, at a heating rate $10^\circ\text{C min}^{-1}$, with an air flow rate of $10 \text{ cm}^3 \text{ min}^{-1}$. The results were interpreted in the light of the detailed study of the thermal behaviour of synthetic $\text{U}(\text{AsO}_3\text{OH})_2\cdot 4\text{H}_2\text{O}$ reported by Chernorukov *et al.* (1985). Štěpíte dehydrates and dehydroxylates in two steps; $4\text{H}_2\text{O}$ is released up to $\sim 150^\circ\text{C}$ by dehydration and further H_2O by dehydroxylation of the two OH groups up to $\sim 220^\circ\text{C}$. These processes partly overlap. The partial release of As_2O_5 and formation of an X-ray amorphous solid phase containing UO_2 and residual As_2O_5 follows and

TABLE 1. Chemical composition of štěpíte from Jáchymov.

	1	2	3	4	5	6	Mean	SD	Ideal
Na_2O	0.08	0.10	0.14	0.10	0.19	0.19	0.13	0.05	
UO_2	49.91	50.63	50.54	50.07	49.71	50.27	50.19	0.36	45.77
SiO_2	0.09	0.09	0.14	0.10	0.20	0.09	0.12	0.04	
P_2O_5	0.29	0.43	0.50	0.50	0.51	0.51	0.46	0.09	
As_2O_5	39.55	39.73	37.82	37.41	38.41	38.91	38.64	0.93	38.96
SO_3	1.23	1.89	1.84	2.39	2.51	1.85	1.95	0.46	
$\text{H}_2\text{O}^\dagger$							16.41		15.27
Total	91.16	92.92	91.05	90.60	91.74	91.96	107.90		100.00
Formula based on 12 O p.f.u.									
Na	0.014	0.018	0.024	0.018	0.033	0.032	0.023		
U	1.008	0.997	1.024	1.012	0.986	1.004	1.010		
Si	0.008	0.008	0.012	0.009	0.018	0.008	0.010		
P	0.023	0.032	0.038	0.039	0.038	0.039	0.040		
As	1.877	1.838	1.800	1.777	1.790	1.825	1.820		
S	0.083	0.126	0.126	0.163	0.168	0.124	0.130		
$\text{H}_2\text{O} + \text{OH}$							5.86		

Analyses 1–6 are individual analyses in wt.%.

Coefficients in the empirical formulae are calculated on the basis of $(\text{Si} + \text{P} + \text{As} + \text{S}) = 2$ a.p.f.u.

* Mean calculated as an average of 1–6.

† The H_2O content (wt.%) calculated on the basis of $4\text{H}_2\text{O} + 2\text{OH}$ derived from the structure determination.

partly overlaps the dehydroxylation. According to Chernorukov *et al.* (1985), this amorphous phase alters to form crystalline $U(\text{IV})\text{As}_2\text{O}_7$ at about 550°C . At higher temperatures the $U(\text{IV})$ oxidizes to $U(\text{VI})$, leading to formation of $(\text{UO}_2)_2\text{As}_2\text{O}_7$ and partial loss of As_2O_3 and O_2 . At temperatures higher than $\sim 850^\circ\text{C}$, $(\text{UO}_2)_2\text{As}_2\text{O}_7$ decomposes to $\text{UO}_{2.67}$ (U_3O_8) and $\text{As}_2\text{O}_3 + \text{O}_2$.

Vibrational spectroscopy

The Raman (Fig. 7) and infrared spectra of štěpíte are interpreted in the light of the discussions of Keller (1971), Mielke and Ratajczak (1972), Vansant *et al.* (1973) and Chernorukov *et al.* (1985). The $\text{AsO}_3\text{OH}^{2-}$ ion belongs to point group C_{3v} . According to Mielke and Ratajczak (1972) and Vansant *et al.* (1973), for modes involving arsenic and oxygen, the total representation reduces to $\Gamma = 3A_1 + 3E$, and thus six fundamental frequencies should be expected in the Raman and infrared spectra.

Raman bands at 3552 and 3484 cm^{-1} and infrared bands at 3457 and 3392 cm^{-1} are assigned to the OH-stretching vibrations of H_2O and OH. Approximate $\text{O}-\text{H}\cdots\text{O}$ bond lengths inferred from Raman and infrared spectra

(Libowitzky, 1999) vary in the range $2.8-3.0\text{ \AA}$. Weak Raman bands observed in the range $6322-3878\text{ cm}^{-1}$ are attributable to overtones and combination bands. A Raman band at 1641 cm^{-1} and an infrared band at 1652 cm^{-1} is assigned to the ν_2 (δ) bending vibration of H_2O . Raman bands at 1490 and 1239 cm^{-1} and infrared bands at 1402 and 1236 cm^{-1} are assigned to $\delta(\text{As}-\text{OH})$ bending.

Raman bands at 896 , 844 and 811 cm^{-1} and infrared bands at 936 , 869 , 853 , 830 and 815 cm^{-1} , are attributed to overlapping $\nu(\text{AsO}_3\text{OH})$ stretching vibrations (ν_1 symmetric and split triply degenerate ν_3 antisymmetric vibrations) and the Raman band at 760 cm^{-1} (and the infrared band at 758 cm^{-1}) to the $\nu(\text{As}-\text{OH})$ stretching vibration. Raman bands at 420 , 401 , 377 , 368 , 351 , 322 and 312 cm^{-1} and infrared bands at 559 and 425 cm^{-1} are connected with $\delta(\text{AsO}_3\text{OH})$ bending vibrations, including the split triply degenerate $\nu_4(\text{AsO}_3\text{OH})$ antisymmetric (559 (IR), 425 (IR), 420 , 401 , 377 and 368 cm^{-1}) and the split doubly degenerate $\nu_2(\text{AsO}_3\text{OH})$ symmetric (351 , 322 and 312 cm^{-1}) bending vibrations.

An infrared band at 653 cm^{-1} may be attributed to libration modes of H_2O molecules and very

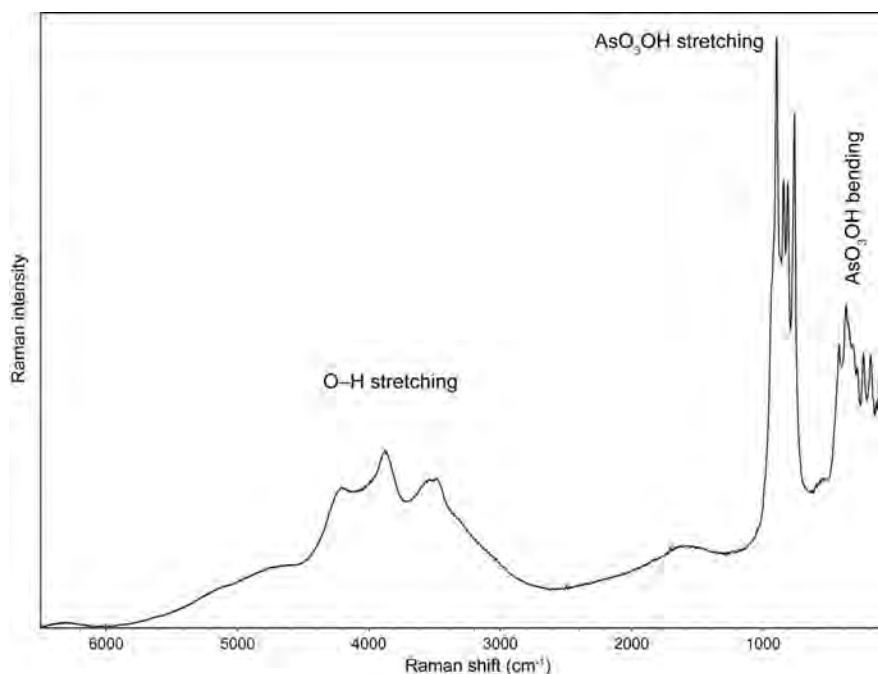


FIG. 7. The Raman spectrum of štěpíte.

weak infrared bands at 1076, 1035 and 1004 cm^{-1} probably to overtones and/or combination bands and/or (PO₃OH) antisymmetric and symmetric stretching vibrations, respectively, due to the presence of minor phosphorus in the sample (see chemical analyses). Raman bands at 287, 262 and 235 cm^{-1} are assigned to the $\nu(\text{OH}\cdots\text{O})$ stretching vibrations and those at 180, 160, 139, 115 and 107 cm^{-1} to lattice modes.

Single-crystal X-ray diffraction

A 0.16 × 0.13 × 0.08 mm tabular crystal of štěpíte was selected for single-crystal X-ray diffraction studies on an Oxford diffraction Gemini four-circle diffractometer, using graphite monochromated MoK α radiation ($\lambda = 0.71073 \text{ \AA}$), collimated with a fibre optics Mo-Enhance collimator and detected with an Atlas CCD detector. The unit cell was refined from 15,315 reflections by the least-squares algorithm of the

CrysAlisPro package (Agilent Technologies) which gave a tetragonal *I*-centred cell with $a = 10.9894(1)$, $c = 32.9109(6) \text{ \AA}$, $V = 3974.5(1) \text{ \AA}^3$ and $Z = 16$. From a total of 59,943 measured reflections, 1523 were unique and 1434 had $I_{\text{obs}} > 3\sigma(I)$. An analytical shape-based correction (Clark and Reid, 1997) combined with an empirical correction for absorption (multi-scan) was applied (*CrysAlis RED*) leading to an R_{int} index for the merged dataset of 0.0360. A summary of data collection, crystallographic data and refinement is given in Table 2.

The crystal structure was solved by the charge-flipping method using *Superflip* (Palatinus and Chapuis, 2007) and refined using *Jana2006* (Petříček *et al.*, 2006). An analysis of the reflections suggested an *I*-centred lattice, with space group $I4_1acd$, and this was subsequently confirmed by the refinement. All atoms were refined anisotropically (Table 3), however, attempts to include hydrogen atoms in the

TABLE 2. Summary of crystal data, data collection and refinement parameters for štěpíte.

Structural formula	U(AsO ₃ OH) ₂ (H ₂ O) ₄
Crystal data	
<i>a</i>	10.9867(2) Å
<i>c</i>	32.9271(5) Å
<i>V</i>	3974.6(1) Å^3
<i>Z</i>	16
Space group	$I4_1acd$
Data collection	
Temperature	293 K
Detector; wavelength	Atlas CCD; MoK α (0.71073 Å)
Crystal dimensions	0.16 × 0.13 × 0.08 mm
Collection mode	ω rotational scans to fill Ewald sphere
Limiting θ angles	2.89–30.44°
Limiting Miller indices	−15 < <i>h</i> < 15, −15 < <i>k</i> < 15, −47 < <i>l</i> < 46
Reflections collected	59,943
No. of unique reflections	1523
No. of observed reflections (criterion)	1434 [$I_{\text{obs}} > 3\sigma(I)$]
R_{int} , coverage	0.0356, 99.57%
Absorption coefficient (mm^{-1}), $T_{\text{min}}/T_{\text{max}}$	23.00, 0.096/0.255
F_{000}	4192
Refinement	
Parameters refined, constraints	70, 0
R_{obs} , wR_{obs}	0.0353, 0.1478
R_{all} , wR_{all}	0.0379, 0.1488
GOF _{obs} /GOF _{all}	2.99/2.92
$\Delta\rho_{\text{min}}$, $\Delta\rho_{\text{max}}$ (e \AA^{-3})	−2.43, 2.21
Weighting scheme, details	σ , $w = 1/(\sigma^2(I) + 0.00016I^2)$

TABLE 3. Atom positions, equivalent- and anisotropic-displacement parameters (in \AA^2) for štěpíte.

	x/a	y/a	z/c	U_{eq}^*	U_{11}	U_{22}	U_{33}	U_{12}	U_{13}	U_{23}
U	0.16022(3)	0.66022(3)	0	0.0111(1)	0.0099(2)	0.0099(2)	0.0134(3)	-0.0001(1)	-0.00001(8)	0.00001(8)
As	0.35936(7)	0.87363(7)	0.05741(2)	0.0090(2)	0.0088(3)	0.0083(3)	0.0099(4)	-0.0020(3)	-0.0011(2)	0.0008(3)
O1	$\frac{3}{4}$	0.8572(7)	$\frac{1}{2}$	0.023(2)	0.040(5)	0.012(4)	0.015(4)	0	-0.006(4)	0
O2	0.3929(7)	0.8334(6)	0.1062(2)	0.025(2)	0.030(4)	0.026(3)	0.018(3)	-0.015(3)	-0.006(3)	0.008(2)
O3	$\frac{1}{2}$	$\frac{1}{2}$	0.0870(3)	0.031(3)	0.038(6)	0.038(5)	0.018(5)	-0.001(5)	0	0
O4	0.4716(5)	0.8237(5)	0.0275(2)	0.019(2)	0.013(3)	0.017(3)	0.028(3)	-0.002(2)	0.008(2)	-0.003(2)
O5	0.3469(5)	1.0227(5)	0.0586(2)	0.013(1)	0.019(3)	0.011(3)	0.010(2)	0.000(2)	-0.001(2)	0.002(2)
O6	0.2305(5)	0.8037(5)	0.0452(2)	0.013(1)	0.012(2)	0.013(2)	0.015(2)	0.001(2)	0.003(2)	0.001(2)
O7	0.0841(6)	0.8649(5)	-0.0204(2)	0.016(2)	0.016(3)	0.010(2)	0.021(3)	-0.001(2)	-0.006(2)	-0.001(2)

All atoms were refined with anisotropic-displacement parameters.

*The value of U_{eq} is one third of the trace of the orthogonalized U_{ij} tensor.

refinement based on difference-Fourier maps were not successful. The final cycles of refinement converged quickly to the following agreement indices: $R_1 = 0.0353$, $R_2 = 0.0379$, $wR_2 = 0.1488$ and a $GOF_{obs} = 2.99^1$ for 1434 unique observed reflections. For structure graphics the program *Diamond* v.3.1 (Brandenburg and Putz, 2005) was used. Some geometrical characteristics were calculated using *Vesta* (Momma and Izumi, 2008). Bond-valence analysis was carried out following the procedure of Brown (1981, 2002), using bond strengths for $U^{4+}-O$ from Brese and O'Keeffe (1991), and $As^{5+}-O$ from Brown and Altermatt (1985).

Description of the crystal structure

The asymmetric unit of the štěpíte structure contains one U atom, one As atom and seven O atoms. The U atom is coordinated by eight ligands, which form a distorted Archimedean antiprism (Fig. 8a). The mean U–O bond length in štěpíte, 2.38 \AA (Table 4), is similar to běhounekite, 2.35 \AA (Plášil *et al.*, 2011);

¹ *Jana2006* uses a weighting scheme based on experimental expectations that do not force the GOF to be equal to one. Therefore, values of GOF are usually larger than those obtained from the *SHELX* program. However, such higher values of GOF may indicate some unresolved features in the data, especially when looking at difference-Fourier electron density. In order to explain the GOF, we checked the data thoroughly. We conclude that the higher GOF is connected neither with any kind of twinning, nor with the absorption correction. The 3D projections of the difference electron density show that significant Fourier density is located spherically around the As atom. The check of the reflection classes suggested the possible influence of an extinction effect, which was confirmed by the refinement [B-C type 1 $G_{iso} = 1000(300)$; after Becker and Coppens (1974)]. Then we succeeded in the refinement of the U and As occupation factors, which was followed the significant decrease of the R factors and GOF. Finally we refined also the occupancy of O2 sites, belonging to the OH group. Final $R_1 = 0.0294$, $wR_2 = 0.1186$ (obs); $R_1 = 0.0321$, $wR_2 = 0.1199$ (all) with $GOF = 2.40/2.35$ (obs/all). The refined occupancies resulted in the non-electroneutral composition: $U_{0.855}$, $As_{1.879}$, $O_{11.868}$ (12.47 +; 13.044 -). It is possible that the crystal structure of štěpíte may exhibit such behaviour and non-stoichiometry, but based on the current data, we are not able to decide, if this is so. Therefore we present the model with full occupancies, provided by the converging stable refinement.

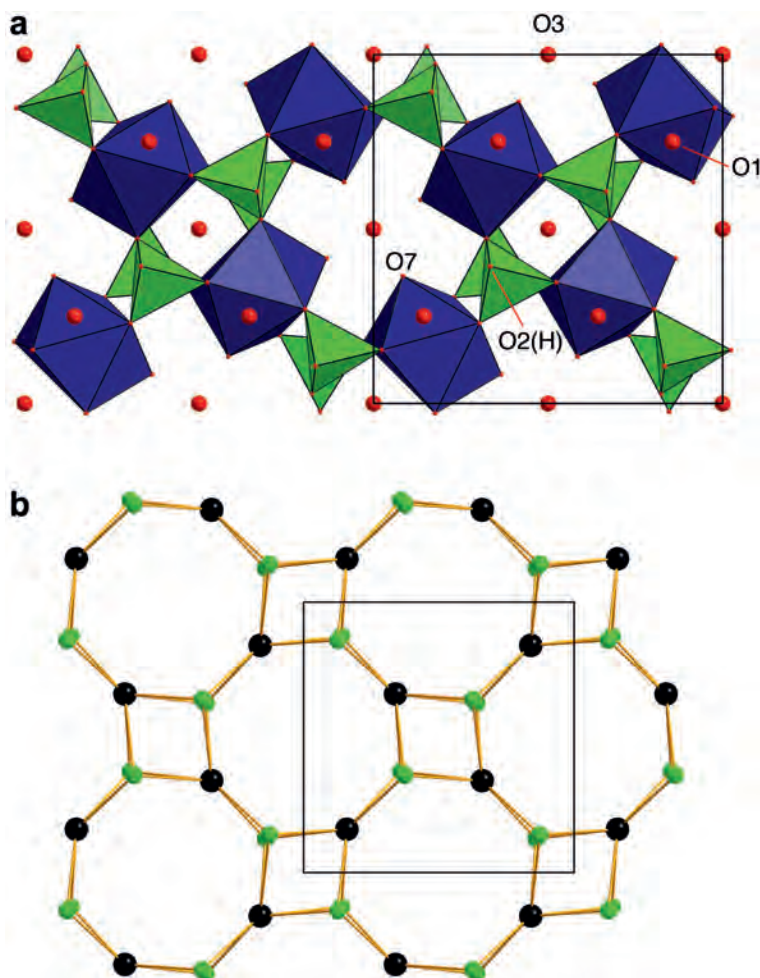


FIG. 8. (a) The linkages of UO_8 polyhedra (dark blue) and $\text{AsO}_3\text{OH}^{2-}$ groups (green) in štěpíte. The O1, O3 and O7 atoms belong to H_2O groups. (b) A representation of U–As connectivity within the sheet; each U atom (black) is linked to 6 As (green) and through the tetrahedral unit each U is thus linked to five other U atoms. Unit-cell edges are outlined, both views are along c .

$\gamma\text{-U}(\text{MoO}_4)_2$, 2.35 Å (Krivovichev and Burns, 2004); and ianthinite, 2.29 Å for the [6]-coordinate U in the structure (Burns *et al.*, 1997). Six O atoms which belong to $(\text{AsO}_3\text{OH})^{2-}$ groups, and two O atoms (O7) which belong to H_2O groups, are coordinated around the U atom (Table 5). Each UO_8 polyhedron is therefore bonded to five other U polyhedra via six $(\text{AsO}_3\text{OH})^{2-}$ groups (Fig. 8b). Each U vertex is 6-connected, and each As vertex is 3-connected. In comparison, $\gamma\text{-U}(\text{MoO}_4)_2$ contains 8-connected U and 2-connected Mo atoms (Krivovichev and Burns, 2004), and $\text{U}(\text{SO}_4)_2(\text{H}_2\text{O})_4$, contains 4-

connected U and 2-connected S (Kirkegaard, 1956; Plášil *et al.*, 2011). The hydrogen atom in the $(\text{AsO}_3\text{OH})^{2-}$ group is bonded to the O2 atom, which is not linked to any of the UO_8 polyhedra. The resulting As–O2 bond length, of 1.71 Å, is longer than the ~ 1.66 Å for the other O atoms (O4, O5, O6) in the As-centred ‘tetrahedron’, producing a small distortion and trigonal pyramidal symmetry. The linkage of UO_8 polyhedra and AsO_3OH groups produces a sheet parallel to (001) (Fig. 9). Adjacent sheets are linked by hydrogen bonds via H_2O groups in the interlayer. The large distance between the uranium-arsenate

TABLE 4. Selected bond distances (Å) and polyhedral geometry for štěpíte.

U–O4 ⁱ	2.266(6)	As–O2	1.707(6)
U–O4 ⁱⁱ	2.266(6)	As–O4	1.673(6)
U–O5 ⁱⁱⁱ	2.447(5)	As–O5	1.647(5)
U–O5 ^{iv}	2.447(5)	As–O6	1.661(5)
U–O6	2.299(5)	<As–O>	1.67
U–O6 ^v	2.299(5)		
U–O7	2.493(6)		
U–O7 ^v	2.493(6)		
<U–O>	2.38		
O1–O2 ^{vi, vii}	2.685(9)	O4–O5 ^v	2.901(9)
O1–O5 ^{viii, ix}	2.770(7)	O4–O6	2.725(8)
O1–O6 ^{vi, vii}	3.169(8)	O4–O6 ^v	3.197(9)
O2–O3 ^{vi}	2.875(9)	O4–O7 ^v	2.893(8)
O2–O4	2.732(9)	O4–O7 ^{vii}	2.883(8)
O2–O5	2.658(9)	O5–O6	2.765(8)
O2–O6	2.707(9)	O5–O7 ^{xi}	2.725(8)
O3–O7 ^{v, x}	2.79(1)	O6–O6 ^v	3.158(9)
O4–O4 ^v	2.936(8)	O6–O7	2.780(9)
O4–O5	2.780(8)	O6–O7 ^v	2.941(8)
O4–O5 ^{viii}	2.800(8)	O7–O7 ^{iii, xi}	2.816(9)

Symmetry codes: (i) $-y+1, x, -z$; (ii) $x-1/2, -y+3/2, z$; (iii) $y-1, -x+1, -z$; (iv) $-x+1/2, y-1/2, z$; (v) $y-1/2, x+1/2, -z$; (vi) $-x+1, -y+3/2, -z+1/4$; (vii) $x+1/2, -y+3/2, z$; (viii) $-x+1, -y+2, z$; (ix) $x+1/2, -y+2, -z+1/4$; (x) $-y+3/2, -x+1/2, -z$; (xi) $-y+1, x+1, -z$.

sheets ($d_{001} = 8.3 \text{ \AA}$) explains the perfect cleavage of štěpíte and also the dominance of (00 l) reflections in the powder patterns collected in Bragg–Brentano geometry.

High-resolution powder diffraction

A fragment of a crystal of the type II morphological variant of štěpíte (see Fig. 5) was selected a high-resolution synchrotron powder-diffraction study. Powder-diffraction data were

TABLE 5. Bond-valence analysis for štěpíte based on single-crystal and Rietveld refinements.

	– Single-crystal refinement –			— Rietveld refinement —			Assignment
	U	As	ΣBV	U	As	ΣBV	
O1			0.00			0.00	H ₂ O
O2		1.18	1.18		1.23	1.23	OH
O3			0.00			0.00	H ₂ O
O4	$0.66 \times 2\downarrow$	1.29	1.95	$0.65 \times 2\downarrow$	1.17	1.73	O
O5	$0.40 \times 2\downarrow$	1.38	1.78	$0.46 \times 2\downarrow$	1.16	1.62	O
O6	$0.60 \times 2\downarrow$	1.33	1.93	$0.50 \times 2\downarrow$	1.32	1.82	O
O7	$0.36 \times 2\downarrow$		0.36	$0.28 \times 2\downarrow$		0.28	H ₂ O
ΣBV	4.04	5.18		3.78	4.88		

Multiplicity is indicated by $\times \downarrow$; U^{4+} –O bond strengths are taken from Brese and O’Keefe (1991), and As^{5+} –O bond strengths from Brown and Altermatt (1985).

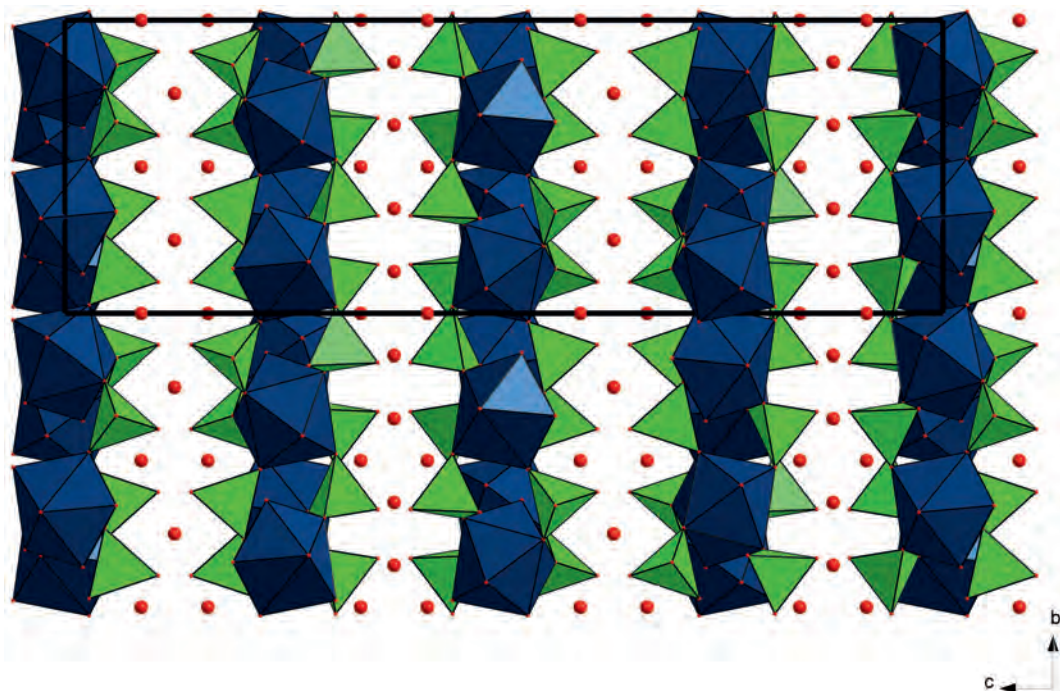


FIG. 9. The crystal structure of štěpíte viewed along [100]. The sheets of UO_8 (dark blue) and AsO_3OH polyhedra (green) lie parallel to (001). The H_2O groups (red) in the interlayer are involved in hydrogen bonding which provides the only link between adjacent sheets. Unit-cell edges are shown.

collected on the Rossendorf beamline BM20 at the European Synchrotron Research Facility (ESRF) in Grenoble. The energy of the beam was fixed at 30 keV (corresponding to a wavelength of 0.41328 Å). The precision of the wavelength was confirmed using a LaB_6 standard. The beamline is equipped with a double Si(111) monochromator and two collimating/focussing mirrors (with Si and Pt coatings). The powder sample was loaded into a 0.3 mm glass capillary and placed on a Huber six-circle diffractometer. The diffraction pattern was acquired at room temperature between 1° and 35° 2θ using a step size of 0.005° .

A Rietveld refinement was made using *Jana2006* (Petříček *et al.*, 2006). The structure that had been determined by single-crystal analysis was used as the starting model. Unit-cell parameters, $a = 11.0015(6)$, $c = 32.855(3)$ Å, a *FWHM* function, the peak-profile asymmetry, atom coordinates and displacement parameters were all refined. Rietveld refinement confirmed the proposed structural model (Table 6). The refinement converged to the following agreement

indices: $R_p = 0.0297$, $R_{wp} = 0.0442$ and $R_{Bragg} = 0.0332$; with a GOF = 2.97. The bond-valence sums, based on interatomic distances refined by the Rietveld method, are listed for comparison in Table 5. A crystallographic information file has been deposited with *Mineralogical Magazine* and can be downloaded from http://www.minersoc.org/pages/e_journals/dep_mat_mm.html.

Powder X-ray diffraction data

In order to obtain X-ray powder diffraction data at normal resolution a Bruker D8 Advance diffractometer equipped with a LynxEye 1D solid-state detector (sensitive solid angle 3.2°), operating at 40 kV and 40 mA, and using $\text{CuK}\alpha$ radiation (Ni-filtered) was used. A small amount of štěpíte was placed onto a low-background silicon holder and scanned in Bragg–Brentano geometry. A step size of 0.01° in the range $5\text{--}50^\circ 2\theta$ with variable counting time (total counting time was 8 h) was used. For profile fitting of each diffraction maximum, *DIFFRAC TOPAS* software version 4.2 (BrukerAXS) was used with a pseudo-Voigt

TABLE 6. Atom positions and displacement parameters, U_{iso} (\AA^2), for štěpíte determined from the Rietveld refinement.

Atom	x/a	y/a	z/c	U_{iso}
U	0.1591(4)	0.6591(4)	0	0.007
As	0.359(2)	0.872(1)	0.0570(2)	0.012
O1	$\frac{3}{4}$	0.87(1)	$\frac{1}{8}$	0.023
O2	0.395(7)	0.840(8)	0.106(3)	0.032
O3	$\frac{1}{2}$	$\frac{1}{2}$	0.084(3)	0.031
O4	0.475(7)	0.805(8)	0.029(3)	0.027
O5	0.34(1)	1.026(7)	0.058(2)	0.010
O6	0.225(6)	0.811(8)	0.046(2)	0.020
O7	0.084(6)	0.872(7)	-0.021(2)	0.011

profile shape corrected for asymmetry. The powder pattern (Table 7) was indexed in accordance with calculated values for intensities obtained from the crystal-structure refinement. The unit cell was refined based on the position of 30 reflections (Table 7) using *UNITCELL* (Holland and Redfern, 1997). The refined unit cell parameters are $a = 10.9905(4)$, $c = 32.782(2)$ \AA and $V = 3959.7(3)$ \AA^3 .

X-ray absorption spectroscopy

As a check on the valence state of the U in štěpíte, X-ray absorption spectroscopy (XAS) profiles were collected at the ANKA synchrotron in Karlsruhe, Germany on the INE beamline (Dardenne *et al.*, 2009). The powdered sample was mixed with solid polyethylene in an agate mortar. The uranium L_{III} edge X-ray absorption near-edge spectrum (XANES) was collected at room temperature in transmission geometry. The beamline was calibrated using a yttrium foil. Data were processed with *Horae* software (Ravel and Newville, 2005). In addition to štěpíte, data for natural schoepite and synthetic UO_2 were collected to provide comparative spectra for compounds containing U^{6+} and U^{4+} . Figure 10 compares the spectra of all three phases, and clearly shows that U is tetravalent in štěpíte, as there is no U=O shoulder above 17180 eV. Our spectra also hint at partial oxidation of the UO_2 sample; U^{6+} is likely to be present in small quantities and hence the formula might be better expressed UO_{2+x} .

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TABLE 7. Powder-diffraction pattern for štěpíte.

d_{obs}	d_{calc}	I_{obs}	I_{calc}	h	k	l
8.190	8196	100	100	0	0	4
7.008	7022	43	61	1	1	2
5.475	5495	18	17	2	0	0
4.560	4564	10	14	2	0	4
	4483		18	2	1	3
4.479	4470	9	<1	1	1	6
4.111	4098	16	2	0	0	8
3.934	3933	12	43	2	1	5
3.869	3886	6	2	2	2	0
	3400		60	3	1	2
3.395	3391	20	58	2	1	7
3.291	3285	6	5	2	0	8
3.030	3035	4	4	3	2	1
2.9328	29265	18	42	2	1	9
2.7649	27476	12	19	4	0	0
2.7439	27319	5	1	0	0	12
2.6034	26051	5	9	4	0	4
2.5890	25897	4	8	4	1	3
2.5572	25587	7	20	3	3	2
2.4220	24463	3	<1	2	0	12
2.3845	23848	4	2	3	1	10
2.3453	23407	3	9	3	3	6
2.1543	21511	25	5	4	1	9
2.0590	20489	4	5	0	0	16
2.0065	20062	3	4	5	2	3
1.9897	19868	4	7	4	1	11
1.9479	19487	5	12	5	2	5
1.9283	19420	4	6	3	1	14
1.8740	18710	4	12	5	2	7
1.8308	18318	4	6	6	0	0

The six strongest lines in the powder pattern are listed in bold.

The differing collection geometries and preferred orientation effects produce considerable differences in the observed and calculated intensities.

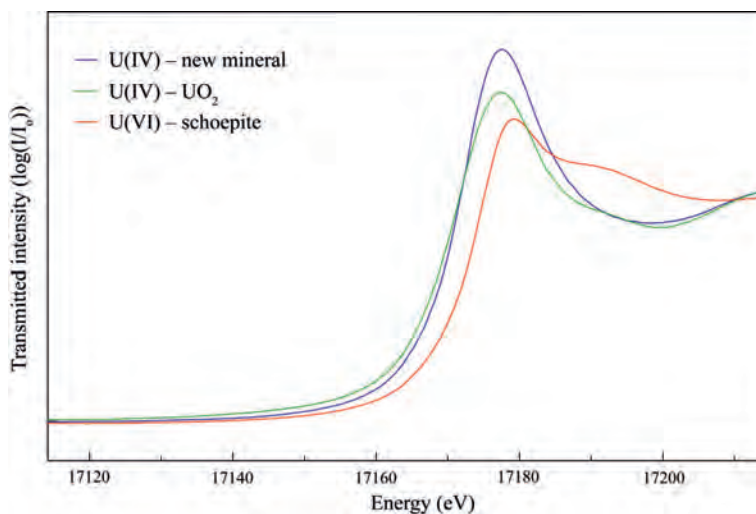


FIG. 10. Normalized XANES spectra of štěpíte, synthetic UO_2 and schoepite.

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Determination Software Programs. Institute of Physics, Praha, Czech Republic.

Palatinus, L. & Chapuis, G. (2007). J. Appl. Cryst. 40, 786-790.

enable this reference if Diamond ver. 2 was used for visualization
#Brandenburg, K. (1999). <i>DIAMOND</i>. Version. 2.1c. #Crystal Impact GbR,
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#Brandenburg, K. & Putz, H. (2005). <i>DIAMOND</i> Version 3. #Crystal Impact
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#Altomare, A., Burla, M. C., Camalli, M., Cascarano, G., Giacovazzo, C.,
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#<i>SIR97</i>. A Package for Crystal Structure Solution by Direct Methods #and
Refinement, Bari, Rome, Italy.

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#Burla, M.C., Camalli, M., Carrozzini, B., Cascarano, G., Giacovazzo, C.,
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J. Appl. Cryst. 29, 479-480.

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6   x,-y+1/2,-z+3/4
7   y+1/2,x+1/2,-z
8   -y,-x,-z+1/2
9   -x,-y+1/2,-z+1/4
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14  -x,y,z+1/2
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23  y,x,-z+1/2
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26  x,y+1/2,-z+1/4
27  y+1/2,-x+1/2,-z+1/2
28  -y,x,-z
29  x,-y,z+1/2
30  -x+1/2,y+1/2,z
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32  y+1/2,x,z+1/4
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_cell_length_b                 10.9867(2)
_cell_length_c                 32.9271(5)
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7. EXPERIMENTAL DATA

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O1 O 0.75 0.8566(7) 0.125 Uani 0.022(2) 16 1 d . . .
O2 O 0.3930(7) 0.8334(6) 0.10623(19) Uani 0.0240(19) 32 1 d . . .
O3 O 0.5 0.5 0.0867(3) Uani 0.031(3) 16 1 d . . .
O4 O 0.4720(5) 0.8236(5) 0.02759(19) Uani 0.0195(17) 32 1 d . . .
O5 O 0.3468(5) 1.0230(5) 0.05855(16) Uani 0.0127(14) 32 1 d . . .
O6 O 0.2305(5) 0.8034(5) 0.04523(17) Uani 0.0131(14) 32 1 d . . .
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04 06 . . 2.725(8) ?
04 06 . 7_455 3.197(9) ?
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# 11. STRUCTURE-FACTOR LIST
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  0 4 0 2305740. 2435590. 4339. o
  2 4 0 61826. 58744. 395. o
  4 4 0 1244000. 1322690. 3111. o
  0 6 0 1769420. 1767870. 4656. o
  2 6 0 43944. 34538. 453. o
  4 6 0 333788. 326375. 1410. o
  6 6 0 506327. 500451. 3041. o
  0 8 0 192664. 220256. 2157. o
  2 8 0 44. 3920. 224. o
  4 8 0 160569. 167180. 1308. o
  6 8 0 6989. 8592. 346. o
  8 8 0 93763. 94803. 1844. o
  0 10 0 603866. 613201. 4095. o
  2 10 0 38922. 40565. 708. o
  4 10 0 303425. 304828. 2128. o
  6 10 0 189891. 201583. 1904. o
  8 10 0 6778. 7107. 499. o
  10 10 0 84613. 91687. 2513. o
  0 12 0 59701. 54181. 1615. o
  2 12 0 12514. 12887. 588. o
  4 12 0 2690. 4134. 351. o
  6 12 0 121175. 116972. 1652. o
  8 12 0 44635. 40472. 1194. o
  10 12 0 20292. 22460. 1532. o
  0 14 0 39977. 40560. 1743. o
  2 14 0 11. 2614. 421. o
  4 14 0 26968. 25657. 1012. o
  6 14 0 185. 2370. 588. o
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  2 3 1 105031. 138022. 375. o
  1 4 1 88018. 65996. 325. o
  3 4 1 7488. 13610. 146. o

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4	7	1	156757.	154988.	799.	o
6	7	1	25886.	27837.	382.	o
1	8	1	132448.	122289.	747.	o
3	8	1	6060.	8483.	224.	o
5	8	1	131986.	125283.	851.	o
7	8	1	132060.	125723.	939.	o
2	9	1	13993.	17486.	323.	o
4	9	1	1328.	2242.	146.	o
6	9	1	42527.	44446.	606.	o
8	9	1	12375.	14084.	424.	o
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3	10	1	32587.	33274.	486.	o
5	10	1	247166.	247819.	1420.	o
7	10	1	11486.	10543.	323.	o
9	10	1	63696.	62711.	970.	o
2	11	1	158951.	155989.	1202.	o
4	11	1	124507.	122614.	1056.	o
6	11	1	4814.	5351.	247.	o
8	11	1	168120.	165778.	1574.	o
10	11	1	47874.	47407.	936.	o
1	12	1	13333.	12614.	403.	o
3	12	1	7728.	7396.	320.	o
5	12	1	2657.	3769.	242.	o
7	12	1	30336.	29926.	627.	o
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3	14	1	11420.	10788.	481.	o
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7	14	1	31505.	31825.	2352.	o
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9	9	2	162674.	166200.	2216.	o
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3	11	2	38745.	43684.	622.	o
5	11	2	21414.	21443.	458.	o
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9	11	2	12442.	11748.	473.	o
11	11	2	38327.	29895.	1350.	o
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3	6	3	13861.	15748.	237.	o
5	6	3	7004.	8873.	187.	o
2	7	3	323446.	329403.	1129.	o
4	7	3	177595.	178738.	936.	o
6	7	3	76073.	78995.	632.	o
1	8	3	52878.	43515.	424.	o
3	8	3	374.	1527.	107.	o
5	8	3	94754.	84687.	728.	o
7	8	3	151868.	150149.	1020.	o
2	9	3	9149.	9287.	237.	o
4	9	3	1721.	3205.	164.	o
6	9	3	60.	1168.	135.	o
8	9	3	6117.	6511.	276.	o
1	10	3	106547.	101327.	843.	o
3	10	3	19846.	20080.	406.	o
5	10	3	86098.	84884.	827.	o
7	10	3	5927.	7622.	289.	o
9	10	3	10841.	10803.	424.	o
2	11	3	217601.	215667.	1415.	o
4	11	3	115022.	113218.	1015.	o
6	11	3	38332.	38672.	656.	o
8	11	3	146317.	146674.	1436.	o

10	11	3	22137.	22619.	643.	o
1	12	3	4311.	5866.	294.	o
3	12	3	11902.	10939.	377.	o
5	12	3	6163.	6285.	297.	o
7	12	3	74842.	71186.	1028.	o
9	12	3	1924.	2703.	278.	o
2	13	3	56253.	56350.	923.	o
4	13	3	42265.	39941.	778.	o
6	13	3	12524.	12869.	484.	o
8	13	3	49934.	47625.	1347.	o
1	14	3	79251.	77837.	1165.	o
3	14	3	3091.	3663.	307.	o
5	14	3	66147.	66040.	1184.	o
7	14	3	31712.	31481.	2380.	o
2	15	3	70225.	65210.	1308.	o
4	15	3	23922.	24156.	968.	o
0	2	4	258871.	238673.	874.	o
2	2	4	12973.	12726.	174.	o
1	3	4	4777.	5218.	96.	o
0	4	4	578636.	579592.	1522.	o
2	4	4	7600.	5843.	101.	o
4	4	4	224262.	230463.	1020.	o
1	5	4	47.	273.	49.	o
3	5	4	5612.	7112.	146.	o
0	6	4	833358.	794312.	2583.	o
2	6	4	135426.	126750.	614.	o
4	6	4	259577.	248532.	957.	o
6	6	4	563723.	558565.	2320.	o
1	7	4	4533.	5041.	148.	o
3	7	4	1310.	1959.	117.	o
5	7	4	2978.	3553.	143.	o
0	8	4	23596.	26596.	476.	o
2	8	4	4655.	8012.	203.	o
4	8	4	303.	1993.	133.	o
6	8	4	28510.	29047.	432.	o
8	8	4	150.	1974.	221.	o
1	9	4	19490.	20709.	338.	o
3	9	4	31040.	33237.	471.	o
5	9	4	855.	1254.	127.	o
7	9	4	20756.	20129.	437.	o
0	10	4	310133.	303288.	2045.	o
2	10	4	35864.	37020.	515.	o
4	10	4	114389.	114261.	962.	o
6	10	4	225917.	227139.	1387.	o
8	10	4	11539.	11605.	390.	o
10	10	4	73477.	74778.	1602.	o
1	11	4	1478.	1798.	164.	o
3	11	4	2585.	3457.	203.	o
5	11	4	6716.	7227.	297.	o
7	11	4	459.	648.	166.	o
9	11	4	9384.	8865.	416.	o
0	12	4	184856.	180902.	2042.	o
2	12	4	40324.	39548.	715.	o
4	12	4	64400.	64958.	884.	o
6	12	4	182851.	180195.	1467.	o
8	12	4	7802.	8415.	414.	o
10	12	4	84910.	80946.	2435.	o
1	13	4	21904.	20621.	570.	o
3	13	4	13412.	13137.	473.	o
5	13	4	10620.	9388.	416.	o
7	13	4	33901.	30891.	866.	o

0	14	4	2355.	4003.	434.	o
2	14	4	48.	838.	224.	o
4	14	4	5771.	5588.	393.	o
6	14	4	36.	648.	343.	<
1	15	4	45.	-242.	284.	<
3	15	4	9.	169.	310.	<
1	2	5	563495.	582315.	910.	o
2	3	5	114726.	142694.	427.	o
1	4	5	151190.	124703.	484.	o
3	4	5	33798.	34954.	260.	o
2	5	5	767494.	791781.	1420.	o
4	5	5	341895.	339225.	1007.	o
1	6	5	42474.	45521.	388.	o
3	6	5	3088.	5809.	156.	o
5	6	5	17382.	16097.	271.	o
2	7	5	21780.	17190.	268.	o
4	7	5	26021.	22403.	333.	o
6	7	5	450.	2497.	140.	o
1	8	5	333837.	331421.	1241.	o
3	8	5	22193.	23069.	364.	o
5	8	5	347033.	342672.	1488.	o
7	8	5	30944.	28909.	458.	o
2	9	5	23548.	24000.	377.	o
4	9	5	8868.	10767.	284.	o
6	9	5	1189.	1818.	143.	o
8	9	5	25648.	27595.	536.	o
1	10	5	76468.	76037.	762.	o
3	10	5	375.	1634.	143.	o
5	10	5	85972.	83898.	848.	o
7	10	5	26268.	25342.	541.	o
9	10	5	4600.	6394.	328.	o
2	11	5	66986.	67788.	786.	o
4	11	5	79287.	79526.	897.	o
6	11	5	1522.	1636.	166.	o
8	11	5	73054.	75957.	1077.	o
10	11	5	54999.	52464.	983.	o
1	12	5	52114.	51038.	830.	o
3	12	5	14786.	15496.	455.	o
5	12	5	56549.	56488.	838.	o
7	12	5	184.	1342.	216.	o
9	12	5	18538.	17772.	637.	o
2	13	5	6912.	7234.	362.	o
4	13	5	7841.	7804.	372.	o
6	13	5	173.	502.	219.	<
8	13	5	5101.	5567.	502.	o
1	14	5	123726.	121532.	1415.	o
3	14	5	4628.	4802.	356.	o
5	14	5	128894.	130267.	1764.	o
2	15	5	373.	697.	336.	<
4	15	5	4909.	5229.	562.	o
1	1	6	2597.	5481.	130.	o
0	2	6	14811.	18537.	226.	o
1	3	6	19492.	10130.	135.	o
3	3	6	618974.	576767.	1426.	o
0	4	6	1189.	2013.	107.	o
2	4	6	23286.	30118.	252.	o
1	5	6	181942.	202876.	721.	o
3	5	6	194119.	200254.	783.	o
5	5	6	7569.	13082.	351.	o
0	6	6	56331.	57656.	663.	o
2	6	6	526.	1028.	78.	o

4	6	6	53256.	58759.	476.	o
1	7	6	10248.	9006.	190.	o
3	7	6	104868.	93188.	666.	o
5	7	6	123593.	123304.	830.	o
7	7	6	31497.	30764.	653.	o
0	8	6	803.	1595.	169.	o
2	8	6	648.	1246.	101.	o
4	8	6	18649.	17707.	338.	o
6	8	6	20627.	20917.	375.	o
1	9	6	144525.	144991.	908.	o
3	9	6	562930.	544045.	1896.	o
5	9	6	30162.	31562.	468.	o
7	9	6	209653.	208968.	1379.	o
9	9	6	263354.	260649.	2484.	o
0	10	6	83330.	77031.	1048.	o
2	10	6	1052.	1132.	125.	o
4	10	6	12354.	11352.	323.	o
6	10	6	46.	499.	127.	o
8	10	6	17439.	16251.	463.	o
1	11	6	40354.	39189.	606.	o
3	11	6	23488.	23860.	512.	o
5	11	6	6094.	7546.	294.	o
7	11	6	30996.	31039.	671.	o
9	11	6	931.	1535.	216.	o
11	11	6	11698.	12164.	1121.	o
0	12	6	8195.	8470.	515.	o
2	12	6	1873.	2196.	211.	o
4	12	6	4396.	4297.	268.	o
6	12	6	3405.	3012.	260.	o
8	12	6	2706.	2224.	226.	o
1	13	6	51967.	52105.	918.	o
3	13	6	191712.	191183.	1777.	o
5	13	6	23604.	23298.	679.	o
7	13	6	84188.	84073.	1277.	o
0	14	6	26347.	21599.	949.	o
2	14	6	138.	697.	239.	<
4	14	6	8516.	7580.	453.	o
6	14	6	19.	531.	317.	<
1	15	6	71644.	68519.	1394.	o
3	15	6	185575.	180132.	2919.	o
1	2	7	1092580.	1167660.	1381.	o
2	3	7	9837.	7713.	112.	o
1	4	7	403764.	423210.	960.	o
3	4	7	1003.	3119.	99.	o
2	5	7	830507.	844695.	1662.	o
4	5	7	212176.	199853.	851.	o
1	6	7	207731.	236207.	848.	o
3	6	7	31484.	38058.	382.	o
5	6	7	308731.	329756.	1308.	o
2	7	7	104891.	98463.	645.	o
4	7	7	87966.	84148.	650.	o
6	7	7	9674.	9505.	260.	o
1	8	7	135564.	127885.	804.	o
3	8	7	4813.	5853.	198.	o
5	8	7	182476.	181243.	1100.	o
7	8	7	52480.	51020.	604.	o
2	9	7	256084.	264871.	1290.	o
4	9	7	37124.	37696.	531.	o
6	9	7	94707.	95409.	858.	o
8	9	7	36218.	36057.	583.	o
1	10	7	4844.	5551.	221.	o

3	10	7	4705.	5502.	237.	o
5	10	7	1144.	1696.	156.	o
7	10	7	46320.	47178.	736.	o
9	10	7	12417.	11108.	406.	o
2	11	7	180841.	173897.	1337.	o
4	11	7	96426.	91445.	1002.	o
6	11	7	26025.	24559.	531.	o
8	11	7	85181.	86466.	1158.	o
10	11	7	27267.	26679.	718.	o
1	12	7	43682.	46796.	801.	o
3	12	7	1487.	2167.	226.	o
5	12	7	54404.	54899.	882.	o
7	12	7	9450.	10889.	440.	o
9	12	7	6898.	6956.	414.	o
2	13	7	841.	1254.	239.	o
4	13	7	12558.	11958.	486.	o
6	13	7	10934.	10457.	463.	o
8	13	7	8617.	9276.	721.	o
1	14	7	12699.	15114.	570.	o
3	14	7	626.	905.	242.	o
5	14	7	14659.	16381.	627.	o
2	15	7	45546.	45594.	1345.	o
0	0	8	76687.	54394.	544.	o
0	2	8	181351.	191547.	754.	o
2	2	8	15230.	19684.	258.	o
1	3	8	8031.	12635.	151.	o
0	4	8	14568.	10920.	239.	o
2	4	8	88907.	96088.	466.	o
4	4	8	46858.	71521.	630.	o
1	5	8	395.	799.	65.	o
3	5	8	11338.	12120.	208.	o
0	6	8	325982.	273945.	1519.	o
2	6	8	155313.	158635.	754.	o
4	6	8	93456.	81047.	609.	o
6	6	8	351570.	330709.	1956.	o
1	7	8	245.	434.	78.	o
3	7	8	32.	315.	78.	o
5	7	8	721.	856.	99.	o
0	8	8	391305.	410010.	2060.	o
2	8	8	6954.	8382.	211.	o
4	8	8	273935.	282048.	1374.	o
6	8	8	99869.	98260.	851.	o
8	8	8	69947.	77765.	1129.	o
1	9	8	2767.	3460.	172.	o
3	9	8	11945.	11503.	302.	o
5	9	8	513.	754.	125.	o
7	9	8	621.	858.	143.	o
0	10	8	105790.	98378.	1197.	o
2	10	8	64883.	63293.	715.	o
4	10	8	11331.	11558.	351.	o
6	10	8	148202.	147946.	1207.	o
8	10	8	51967.	52784.	809.	o
10	10	8	82020.	78212.	1662.	o
1	11	8	95.	250.	151.	<
3	11	8	1712.	1675.	187.	o
5	11	8	340.	299.	156.	<
7	11	8	916.	1311.	200.	o
9	11	8	19.	151.	192.	<
0	12	8	576667.	585237.	3936.	o
2	12	8	70962.	71175.	1030.	o
4	12	8	301082.	302383.	2185.	o

6	12	8	259433.	260667.	1998.	o
8	12	8	11236.	10770.	473.	o
1	13	8	1946.	2130.	250.	o
3	13	8	492.	1025.	242.	o
5	13	8	2743.	3072.	286.	o
7	13	8	5904.	5242.	382.	o
0	14	8	24471.	21310.	931.	o
2	14	8	534.	908.	242.	o
4	14	8	21021.	19081.	684.	o
6	14	8	215.	1693.	408.	o
1	15	8	105.	687.	450.	<
3	15	8	42.	-13.	434.	<
1	2	9	1088420.	1159560.	1405.	o
2	3	9	117334.	131701.	505.	o
1	4	9	232168.	215399.	799.	o
3	4	9	2399.	3353.	104.	o
2	5	9	955860.	981902.	1751.	o
4	5	9	253356.	246644.	968.	o
1	6	9	234159.	251225.	989.	o
3	6	9	62689.	69492.	549.	o
5	6	9	188009.	199307.	1090.	o
2	7	9	10328.	9032.	206.	o
4	7	9	37571.	32714.	419.	o
6	7	9	2528.	3660.	177.	o
1	8	9	324343.	319148.	1392.	o
3	8	9	5418.	5663.	206.	o
5	8	9	274409.	278861.	1387.	o
7	8	9	57224.	56777.	663.	o
2	9	9	226184.	226254.	1264.	o
4	9	9	23494.	24786.	419.	o
6	9	9	86430.	87975.	858.	o
8	9	9	16675.	18849.	455.	o
1	10	9	3213.	2973.	182.	o
3	10	9	15194.	15951.	401.	o
5	10	9	5214.	5406.	250.	o
7	10	9	45728.	43586.	739.	o
9	10	9	10379.	9620.	411.	o
2	11	9	136354.	134807.	1269.	o
4	11	9	105182.	103999.	1111.	o
6	11	9	4114.	5551.	297.	o
8	11	9	79450.	81989.	1093.	o
10	11	9	32372.	30678.	848.	o
1	12	9	60239.	59555.	903.	o
3	12	9	15564.	15468.	489.	o
5	12	9	60697.	62794.	949.	o
7	12	9	436.	1530.	239.	o
9	12	9	22105.	22647.	936.	o
2	13	9	8483.	7638.	408.	o
4	13	9	8903.	8069.	424.	o
6	13	9	22884.	19481.	632.	o
8	13	9	9467.	9201.	739.	o
1	14	9	17449.	19554.	653.	o
3	14	9	904.	1020.	284.	o
5	14	9	25810.	28529.	1002.	o
2	15	9	24798.	25207.	1808.	o
1	1	10	25369.	57945.	390.	o
0	2	10	27228.	36276.	328.	o
1	3	10	63202.	55198.	328.	o
3	3	10	505331.	471693.	1405.	o
0	4	10	26665.	32080.	432.	o
2	4	10	1559.	1948.	83.	o

1	5	10	94550.	101936.	585. o
3	5	10	291115.	303488.	1025. o
5	5	10	4308.	10962.	349. o
0	6	10	16449.	17642.	382. o
2	6	10	2140.	2669.	112. o
4	6	10	932.	1207.	101. o
1	7	10	10725.	18131.	304. o
3	7	10	39264.	30914.	385. o
5	7	10	80236.	84205.	760. o
7	7	10	1420.	3535.	268. o
0	8	10	29682.	30194.	645. o
2	8	10	16.	476.	96. o
4	8	10	4525.	4630.	185. o
6	8	10	4925.	5166.	211. o
1	9	10	176897.	169350.	1085. o
3	9	10	504334.	490727.	1870. o
5	9	10	11328.	12520.	325. o
7	9	10	257585.	253841.	1498. o
9	9	10	203658.	198659.	2073. o
0	10	10	4219.	4901.	320. o
2	10	10	3.	226.	133. <
4	10	10	1844.	2170.	182. o
6	10	10	46.	135.	166. <
8	10	10	4608.	4459.	265. o
1	11	10	64604.	64388.	892. o
3	11	10	89262.	88313.	1043. o
5	11	10	30014.	29031.	617. o
7	11	10	64806.	67070.	957. o
9	11	10	2495.	2908.	263. o
0	12	10	16551.	14906.	663. o
2	12	10	117.	401.	172. <
4	12	10	5241.	5562.	317. o
6	12	10	2599.	2521.	252. o
8	12	10	705.	351.	229. <
1	13	10	47663.	50856.	955. o
3	13	10	221855.	222602.	2073. o
5	13	10	19780.	20467.	645. o
7	13	10	82745.	79570.	1509. o
0	14	10	6268.	6709.	663. o
2	14	10	1640.	2201.	312. o
4	14	10	4893.	3488.	328. o
6	14	10	812.	973.	395. <
1	15	10	106754.	102878.	2903. o
3	15	10	239716.	237679.	6420. o
1	2	11	479745.	456359.	856. o
2	3	11	74566.	83144.	466. o
1	4	11	396944.	402310.	1095. o
3	4	11	24522.	29398.	289. o
2	5	11	539017.	540210.	1402. o
4	5	11	292576.	294636.	1056. o
1	6	11	53711.	54912.	484. o
3	6	11	27428.	31081.	364. o
5	6	11	120468.	126303.	866. o
2	7	11	14064.	12968.	247. o
4	7	11	42204.	38672.	489. o
6	7	11	1833.	3163.	166. o
1	8	11	345153.	340302.	1402. o
3	8	11	42598.	43520.	538. o
5	8	11	394808.	398107.	1662. o
7	8	11	36587.	37319.	564. o
2	9	11	113334.	116379.	918. o

4	9	11	49800.	52784.	637.	o
6	9	11	17162.	17429.	403.	o
8	9	11	49436.	48728.	689.	o
1	10	11	35390.	31575.	567.	o
3	10	11	1886.	3608.	216.	o
5	10	11	15337.	14528.	403.	o
7	10	11	56919.	57511.	838.	o
9	10	11	418.	1798.	211.	o
2	11	11	40991.	40279.	705.	o
4	11	11	60640.	58031.	858.	o
6	11	11	1149.	1488.	213.	o
8	11	11	53398.	57092.	978.	o
10	11	11	46350.	43065.	1798.	o
1	12	11	59988.	61506.	929.	o
3	12	11	21411.	20728.	562.	o
5	12	11	107825.	105711.	1324.	o
7	12	11	106.	947.	237.	o
9	12	11	17741.	17065.	1022.	o
2	13	11	321.	825.	226.	o
4	13	11	6072.	6672.	385.	o
6	13	11	7788.	7042.	398.	o
1	14	11	47581.	48908.	1147.	o
3	14	11	2321.	2565.	349.	o
5	14	11	66870.	66373.	1769.	o
2	15	11	1806.	4082.	965.	o
0	0	12	181452.	110651.	931.	o
0	2	12	28737.	19729.	245.	o
2	2	12	33632.	38144.	406.	o
1	3	12	121591.	141372.	549.	o
0	4	12	124336.	112518.	757.	o
2	4	12	125819.	134346.	648.	o
4	4	12	41668.	42966.	588.	o
1	5	12	18607.	20098.	255.	o
3	5	12	12772.	14583.	229.	o
0	6	12	547924.	512165.	2216.	o
2	6	12	100557.	97204.	645.	o
4	6	12	176685.	167571.	866.	o
6	6	12	486932.	460612.	2518.	o
1	7	12	26342.	27647.	390.	o
3	7	12	43.	466.	96.	o
5	7	12	21101.	21386.	398.	o
0	8	12	98206.	100071.	1176.	o
2	8	12	16671.	18082.	341.	o
4	8	12	98313.	98240.	796.	o
6	8	12	34548.	33479.	505.	o
8	8	12	3866.	6649.	388.	o
1	9	12	38993.	37478.	564.	o
3	9	12	25090.	25553.	437.	o
5	9	12	965.	1022.	130.	o
7	9	12	27111.	24957.	497.	o
0	10	12	151294.	143321.	1670.	o
2	10	12	56670.	53065.	739.	o
4	10	12	50013.	48663.	752.	o
6	10	12	150360.	149798.	1368.	o
8	10	12	22610.	23095.	546.	o
10	10	12	80008.	77210.	1709.	o
1	11	12	2548.	2432.	211.	o
3	11	12	349.	460.	161.	<
5	11	12	10386.	10364.	398.	o
7	11	12	2.	237.	192.	<
9	11	12	8390.	7963.	450.	o

0	12	12	337441.	342428.	3070.	o
2	12	12	50186.	50521.	858.	o
4	12	12	121637.	124237.	1360.	o
6	12	12	185301.	184383.	1904.	o
8	12	12	75.	411.	239.	<
1	13	12	19972.	17302.	619.	o
3	13	12	20629.	19133.	617.	o
5	13	12	3827.	3421.	323.	o
7	13	12	21335.	18368.	801.	o
0	14	12	1108.	1595.	432.	o
2	14	12	149.	770.	273.	<
4	14	12	2091.	3106.	356.	o
1	15	12	271.	-140.	572.	<
1	2	13	527144.	548035.	991.	o
2	3	13	11744.	12083.	198.	o
1	4	13	122361.	112810.	536.	o
3	4	13	413.	1831.	96.	o
2	5	13	379700.	363405.	1158.	o
4	5	13	79823.	72016.	580.	o
1	6	13	21684.	22970.	307.	o
3	6	13	12319.	14490.	268.	o
5	6	13	54209.	53481.	619.	o
2	7	13	229077.	231007.	1067.	o
4	7	13	78650.	78878.	721.	o
6	7	13	31881.	33464.	528.	o
1	8	13	88272.	79744.	715.	o
3	8	13	14.	692.	109.	o
5	8	13	103885.	101114.	853.	o
7	8	13	145419.	146955.	1184.	o
2	9	13	43556.	42646.	611.	o
4	9	13	11256.	12786.	328.	o
6	9	13	7293.	8395.	302.	o
8	9	13	1350.	2154.	179.	o
1	10	13	23863.	23134.	499.	o
3	10	13	104.	1194.	151.	o
5	10	13	20330.	22715.	538.	o
7	10	13	10820.	12182.	403.	o
9	10	13	1367.	1941.	232.	o
2	11	13	237706.	233382.	1688.	o
4	11	13	100760.	99272.	1132.	o
6	11	13	34127.	34546.	799.	o
8	11	13	109758.	110648.	1347.	o
10	11	13	10300.	11196.	1158.	o
1	12	13	1208.	2274.	239.	o
3	12	13	45.	684.	198.	o
5	12	13	6638.	7877.	385.	o
7	12	13	25551.	24851.	705.	o
9	12	13	10.	617.	505.	<
2	13	13	23306.	20733.	713.	o
4	13	13	23115.	21089.	676.	o
6	13	13	146.	1103.	268.	o
1	14	13	28026.	31435.	947.	o
3	14	13	30.	429.	278.	<
5	14	13	39284.	42030.	1517.	o
1	1	14	114573.	113908.	572.	o
0	2	14	53868.	64011.	489.	o
1	3	14	348646.	330872.	869.	o
3	3	14	1062420.	1065190.	2856.	o
0	4	14	179.	541.	86.	o
2	4	14	10298.	11808.	195.	o
1	5	14	1817.	4766.	138.	o

3	5	14	63176.	62138.	551. o
5	5	14	23223.	26274.	510. o
0	6	14	1334.	2279.	174. o
2	6	14	16832.	17484.	284. o
4	6	14	1690.	2729.	135. o
1	7	14	149216.	147200.	851. o
3	7	14	359508.	360140.	1501. o
5	7	14	3666.	4477.	200. o
7	7	14	192127.	196700.	1943. o
0	8	14	12744.	12013.	424. o
2	8	14	54.	533.	104. o
4	8	14	7386.	7135.	242. o
6	8	14	8931.	9313.	302. o
1	9	14	76143.	74310.	830. o
3	9	14	288721.	279988.	1449. o
5	9	14	36993.	35256.	549. o
7	9	14	118682.	119396.	1090. o
9	9	14	186932.	183878.	2164. o
0	10	14	31027.	27928.	760. o
2	10	14	1.	268.	138. <
4	10	14	12581.	11891.	372. o
6	10	14	806.	955.	177. o
8	10	14	15983.	14653.	453. o
1	11	14	8795.	9963.	375. o
3	11	14	1825.	4378.	271. o
5	11	14	2275.	3218.	255. o
7	11	14	2234.	2835.	265. o
9	11	14	3507.	3702.	317. o
0	12	14	39645.	37017.	1199. o
2	12	14	784.	1636.	213. o
4	12	14	10464.	9620.	406. o
6	12	14	6706.	6277.	390. o
8	12	14	3446.	2653.	421. o
1	13	14	52607.	51842.	1095. o
3	13	14	151143.	153513.	1699. o
5	13	14	16639.	17114.	622. o
7	13	14	57809.	57178.	1558. o
0	14	14	14295.	14141.	926. o
2	14	14	120.	546.	302. <
4	14	14	16042.	15431.	976. o
1	2	15	88300.	74112.	395. o
2	3	15	9842.	17216.	239. o
1	4	15	136318.	122796.	593. o
3	4	15	14529.	15673.	268. o
2	5	15	42086.	32048.	354. o
4	5	15	131684.	119630.	773. o
1	6	15	4993.	7042.	179. o
3	6	15	33727.	37126.	458. o
5	6	15	20902.	24611.	432. o
2	7	15	156302.	154759.	882. o
4	7	15	60004.	57367.	645. o
6	7	15	6798.	7713.	273. o
1	8	15	234425.	230843.	1256. o
3	8	15	2328.	4136.	182. o
5	8	15	178392.	174633.	1160. o
7	8	15	80159.	79141.	884. o
2	9	15	2593.	3475.	198. o
4	9	15	28602.	28459.	505. o
6	9	15	29679.	30514.	546. o
8	9	15	23491.	22280.	499. o
1	10	15	123050.	120981.	1124. o

3	10	15	15241.	15520.	421.	o
5	10	15	113208.	111122.	1295.	o
7	10	15	22656.	21906.	564.	o
9	10	15	32273.	33651.	715.	o
2	11	15	82051.	81911.	1046.	o
4	11	15	64244.	64675.	960.	o
6	11	15	367.	1267.	232.	o
8	11	15	84514.	86193.	1249.	o
10	11	15	27284.	27356.	2487.	o
1	12	15	8632.	8558.	419.	o
3	12	15	62.	773.	211.	o
5	12	15	11068.	12005.	492.	o
7	12	15	2783.	3933.	336.	o
2	13	15	103058.	98601.	1441.	o
4	13	15	13894.	14960.	591.	o
6	13	15	23390.	21562.	892.	o
1	14	15	135397.	136838.	1946.	o
3	14	15	11014.	11331.	775.	o
5	14	15	149060.	153284.	3938.	o
0	0	16	2306670.	2414230.	7671.	o
0	2	16	279903.	298579.	1150.	o
2	2	16	23571.	29242.	450.	o
1	3	16	9461.	10132.	161.	o
0	4	16	1276270.	1352850.	3361.	o
2	4	16	71114.	72359.	510.	o
4	4	16	447022.	481958.	2102.	o
1	5	16	17.	315.	68.	o
3	5	16	34.	549.	86.	o
0	6	16	810581.	792767.	2653.	o
2	6	16	134921.	132104.	754.	o
4	6	16	368556.	363405.	1608.	o
6	6	16	383897.	374617.	2357.	o
1	7	16	6690.	6186.	206.	o
3	7	16	193.	536.	112.	o
5	7	16	3101.	2544.	169.	o
0	8	16	85942.	98495.	1077.	o
2	8	16	66.	2352.	146.	o
4	8	16	71213.	76420.	809.	o
6	8	16	287.	1639.	156.	o
8	8	16	78282.	76433.	1301.	o
1	9	16	1943.	2294.	172.	o
3	9	16	2040.	2633.	187.	o
5	9	16	359.	853.	138.	o
7	9	16	2670.	2659.	198.	o
0	10	16	506157.	504483.	3213.	o
2	10	16	34704.	35474.	627.	o
4	10	16	167259.	171046.	1433.	o
6	10	16	183558.	187216.	1670.	o
8	10	16	9246.	8923.	401.	o
10	10	16	77532.	85985.	2104.	o
1	11	16	1281.	1272.	203.	o
3	11	16	290.	728.	177.	o
5	11	16	10212.	9354.	408.	o
7	11	16	141.	-138.	216.	<
9	11	16	2755.	2448.	349.	o
0	12	16	46781.	46668.	1358.	o
2	12	16	26873.	26560.	666.	o
4	12	16	6152.	7606.	406.	o
6	12	16	80750.	82559.	1246.	o
8	12	16	48542.	42423.	1446.	o
1	13	16	1554.	2133.	294.	o

3	13	16	558.	1241.	289. o
5	13	16	2034.	2154.	276. o
0	14	16	32815.	34694.	1431. o
2	14	16	87.	2279.	447. o
4	14	16	14830.	15574.	1225. o
1	2	17	54577.	42287.	312. o
2	3	17	25809.	27096.	323. o
1	4	17	138377.	132039.	622. o
3	4	17	517.	2063.	117. o
2	5	17	2710.	3751.	140. o
4	5	17	55759.	50612.	546. o
1	6	17	63321.	72291.	580. o
3	6	17	20580.	21960.	351. o
5	6	17	60105.	63330.	702. o
2	7	17	192992.	193691.	1033. o
4	7	17	91267.	88235.	851. o
6	7	17	16224.	18574.	432. o
1	8	17	116313.	107048.	871. o
3	8	17	67.	1452.	130. o
5	8	17	98069.	92387.	900. o
7	8	17	144149.	143669.	1282. o
2	9	17	16120.	18100.	421. o
4	9	17	5081.	5608.	271. o
6	9	17	40207.	39977.	674. o
8	9	17	3985.	4360.	265. o
1	10	17	109616.	108877.	1111. o
3	10	17	25665.	26843.	575. o
5	10	17	141546.	141461.	1418. o
7	10	17	4897.	5166.	304. o
9	10	17	66460.	63317.	1056. o
2	11	17	135838.	132866.	1400. o
4	11	17	80037.	80059.	1111. o
6	11	17	11668.	13223.	525. o
8	11	17	140622.	134911.	1579. o
1	12	17	2203.	2914.	281. o
3	12	17	5450.	6196.	351. o
5	12	17	968.	2232.	260. o
7	12	17	30702.	29049.	767. o
2	13	17	124699.	122908.	1636. o
4	13	17	31094.	31206.	866. o
6	13	17	35693.	30618.	1246. o
1	14	17	121101.	125525.	2568. o
3	14	17	7835.	8007.	1433. o
1	1	18	527967.	556833.	1444. o
0	2	18	11747.	15007.	273. o
1	3	18	678683.	692316.	1402. o
3	3	18	1615890.	1649070.	3785. o
0	4	18	160.	434.	120. o
2	4	18	3370.	4347.	156. o
1	5	18	6170.	9328.	198. o
3	5	18	5490.	8816.	224. o
5	5	18	21750.	22858.	564. o
0	6	18	15699.	17603.	408. o
2	6	18	31.	369.	88. o
4	6	18	1980.	2804.	172. o
1	7	18	446635.	453687.	1595. o
3	7	18	638520.	644878.	2052. o
5	7	18	2524.	4100.	211. o
7	7	18	390100.	393453.	2825. o
0	8	18	2624.	2776.	224. o
2	8	18	4782.	4407.	208. o

4	8	18	1307.	1275.	143.	o
6	8	18	443.	715.	164.	o
1	9	18	42681.	40786.	596.	o
3	9	18	194548.	193816.	1381.	o
5	9	18	23898.	25561.	585.	o
7	9	18	42128.	47024.	741.	o
9	9	18	116217.	124919.	1816.	o
0	10	18	2387.	2737.	317.	o
2	10	18	1695.	1485.	169.	o
4	10	18	7838.	7905.	328.	o
6	10	18	1028.	1090.	203.	o
8	10	18	397.	390.	208.	<
1	11	18	42136.	44610.	838.	o
3	11	18	31060.	33295.	715.	o
5	11	18	30834.	29015.	723.	o
7	11	18	38115.	38458.	877.	o
9	11	18	12040.	10117.	793.	o
0	12	18	47.	57.	299.	<
2	12	18	22.	219.	206.	<
4	12	18	574.	585.	219.	<
6	12	18	841.	1306.	242.	o
8	12	18	251.	666.	380.	<
1	13	18	52292.	52500.	1080.	o
3	13	18	97942.	105086.	1634.	o
5	13	18	9324.	10270.	572.	o
0	14	18	583.	2281.	1020.	<
2	14	18	238.	47.	609.	<
1	2	19	4700.	3884.	107.	o
2	3	19	20083.	27608.	341.	o
1	4	19	57189.	48580.	414.	o
3	4	19	2366.	4305.	153.	o
2	5	19	18359.	15220.	273.	o
4	5	19	101793.	96897.	788.	o
1	6	19	14436.	18418.	297.	o
3	6	19	29894.	31070.	453.	o
5	6	19	22559.	24544.	468.	o
2	7	19	309952.	311048.	1324.	o
4	7	19	135241.	129893.	1056.	o
6	7	19	27768.	28149.	575.	o
1	8	19	94378.	88204.	762.	o
3	8	19	2870.	4323.	216.	o
5	8	19	81669.	78766.	929.	o
7	8	19	168090.	161749.	1441.	o
2	9	19	7278.	8262.	307.	o
4	9	19	8979.	9341.	333.	o
6	9	19	16165.	15980.	481.	o
8	9	19	2988.	3808.	273.	o
1	10	19	81031.	77153.	1022.	o
3	10	19	12346.	12476.	401.	o
5	10	19	82674.	79736.	1056.	o
7	10	19	8490.	8395.	398.	o
9	10	19	30573.	30399.	760.	o
2	11	19	152064.	149632.	1556.	o
4	11	19	83288.	80072.	1181.	o
6	11	19	17392.	17242.	577.	o
8	11	19	120045.	115671.	1483.	o
1	12	19	380.	734.	221.	o
3	12	19	7706.	6878.	380.	o
5	12	19	413.	1465.	247.	o
7	12	19	32642.	30355.	1035.	o
2	13	19	99257.	98541.	1485.	o

4	13	19	22299.	21578.	780.	o
6	13	19	21441.	20262.	1407.	o
1	14	19	85730.	89588.	2812.	o
3	14	19	1786.	2625.	1610.	<
0	0	20	1547470.	1600840.	5348.	o
0	2	20	229093.	222105.	1077.	o
2	2	20	52212.	52807.	643.	o
1	3	20	8653.	10294.	198.	o
0	4	20	666091.	672460.	2515.	o
2	4	20	50559.	47755.	473.	o
4	4	20	390354.	391424.	2011.	o
1	5	20	487.	557.	78.	o
3	5	20	79.	429.	101.	o
0	6	20	629317.	603881.	2443.	o
2	6	20	80555.	75993.	684.	o
4	6	20	321783.	319497.	1556.	o
6	6	20	319792.	320894.	2672.	o
1	7	20	628.	1207.	120.	o
3	7	20	2996.	2994.	179.	o
5	7	20	2860.	3223.	208.	o
0	8	20	11562.	13163.	476.	o
2	8	20	1865.	3749.	203.	o
4	8	20	21540.	22814.	476.	o
6	8	20	1747.	2638.	219.	o
8	8	20	25677.	27808.	884.	o
1	9	20	9345.	8345.	317.	o
3	9	20	5566.	4974.	271.	o
5	9	20	908.	1025.	185.	o
7	9	20	14223.	13090.	442.	o
0	10	20	267740.	271291.	2825.	o
2	10	20	21136.	21591.	528.	o
4	10	20	140750.	137455.	1376.	o
6	10	20	162177.	166606.	1621.	o
8	10	20	670.	1238.	226.	o
10	10	20	56809.	63782.	3020.	o
1	11	20	323.	390.	192.	<
3	11	20	33.	195.	200.	<
5	11	20	1129.	1103.	229.	o
7	11	20	366.	408.	242.	<
0	12	20	70877.	69989.	1693.	o
2	12	20	22094.	23123.	695.	o
4	12	20	16610.	17681.	617.	o
6	12	20	82021.	85472.	1298.	o
1	13	20	12089.	11030.	523.	o
3	13	20	13148.	11875.	541.	o
5	13	20	1159.	2227.	760.	<
0	14	20	11010.	14427.	1660.	o
1	2	21	113694.	112581.	572.	o
2	3	21	5963.	8283.	203.	o
1	4	21	117125.	110247.	728.	o
3	4	21	9105.	10486.	255.	o
2	5	21	104807.	99717.	757.	o
4	5	21	134990.	127986.	910.	o
1	6	21	1101.	2986.	146.	o
3	6	21	33.	1337.	133.	o
5	6	21	2539.	3897.	219.	o
2	7	21	81015.	75569.	754.	o
4	7	21	54788.	53606.	726.	o
6	7	21	273.	1686.	174.	o
1	8	21	159071.	154114.	1171.	o
3	8	21	14813.	14750.	401.	o

5	8	21	182215.	178356.	1420.	o
7	8	21	41656.	40058.	718.	o
2	9	21	638.	1540.	179.	o
4	9	21	14208.	15449.	437.	o
6	9	21	11149.	10983.	421.	o
8	9	21	24867.	25472.	622.	o
1	10	21	52103.	52617.	864.	o
3	10	21	2736.	3348.	247.	o
5	10	21	75965.	74794.	1017.	o
7	10	21	21633.	20095.	596.	o
9	10	21	35398.	35087.	1100.	o
2	11	21	53118.	54488.	965.	o
4	11	21	44700.	44262.	926.	o
6	11	21	287.	757.	200.	o
8	11	21	74428.	74375.	1511.	o
1	12	21	28311.	26222.	749.	o
3	12	21	3212.	2638.	286.	o
5	12	21	24961.	24250.	723.	o
7	12	21	1090.	2328.	382.	o
2	13	21	40560.	40968.	983.	o
4	13	21	6209.	7500.	622.	o
1	14	21	110833.	114527.	3951.	o
1	1	22	22559.	19674.	359.	o
0	2	22	15409.	16857.	310.	o
1	3	22	153265.	140873.	715.	o
3	3	22	476782.	441801.	2133.	o
0	4	22	18300.	17819.	432.	o
2	4	22	872.	1152.	104.	o
1	5	22	1329.	2757.	135.	o
3	5	22	45786.	45906.	570.	o
5	5	22	310.	2430.	252.	o
0	6	22	19553.	21404.	502.	o
2	6	22	2589.	2713.	166.	o
4	6	22	2985.	3298.	192.	o
1	7	22	39799.	40219.	551.	o
3	7	22	192738.	183764.	1241.	o
5	7	22	23199.	25610.	541.	o
7	7	22	29742.	32871.	934.	o
0	8	22	3654.	4170.	289.	o
2	8	22	1257.	1558.	164.	o
4	8	22	1828.	1613.	174.	o
6	8	22	17019.	15460.	453.	o
1	9	22	77532.	78847.	955.	o
3	9	22	287296.	284855.	1808.	o
5	9	22	37685.	37298.	726.	o
7	9	22	104240.	107589.	1264.	o
9	9	22	141712.	150407.	2378.	o
0	10	22	25445.	22395.	843.	o
2	10	22	279.	718.	166.	o
4	10	22	9986.	9172.	382.	o
6	10	22	105.	960.	190.	o
8	10	22	14497.	12788.	494.	o
1	11	22	207.	1543.	229.	o
3	11	22	10546.	10353.	468.	o
5	11	22	175.	1033.	221.	o
7	11	22	2884.	3353.	289.	o
0	12	22	9056.	9040.	671.	o
2	12	22	369.	328.	219.	<
4	12	22	2944.	3189.	320.	o
6	12	22	8238.	7229.	559.	o
1	13	22	36302.	40175.	973.	o

3	13	22	137139.	141409.	2427.	o
1	2	23	370825.	366612.	1142.	o
2	3	23	20442.	21334.	330.	o
1	4	23	127952.	126282.	804.	o
3	4	23	7530.	8309.	245.	o
2	5	23	319125.	312827.	1457.	o
4	5	23	122717.	119092.	936.	o
1	6	23	65871.	67942.	674.	o
3	6	23	7403.	8496.	289.	o
5	6	23	58730.	59961.	806.	o
2	7	23	86722.	82580.	814.	o
4	7	23	44242.	42339.	658.	o
6	7	23	2688.	3142.	216.	o
1	8	23	115110.	114415.	1103.	o
3	8	23	1564.	2328.	182.	o
5	8	23	97700.	97184.	1121.	o
7	8	23	50015.	50424.	817.	o
2	9	23	52410.	53801.	830.	o
4	9	23	11037.	11784.	411.	o
6	9	23	37658.	37386.	765.	o
8	9	23	9920.	10793.	450.	o
1	10	23	1788.	2448.	242.	o
3	10	23	128.	916.	182.	o
5	10	23	3728.	4378.	291.	o
7	10	23	10564.	10122.	442.	o
9	10	23	1052.	687.	437.	<
2	11	23	145884.	142853.	1576.	o
4	11	23	60574.	59225.	1082.	o
6	11	23	27242.	25485.	700.	o
8	11	23	74852.	77905.	1831.	o
1	12	23	17830.	18852.	624.	o
3	12	23	260.	1020.	250.	o
5	12	23	9646.	11225.	577.	o
2	13	23	6803.	7018.	726.	o
4	13	23	9490.	11334.	1446.	o
0	0	24	45088.	34585.	934.	o
0	2	24	132506.	126324.	931.	o
2	2	24	85791.	87309.	882.	o
1	3	24	12101.	12442.	221.	o
0	4	24	12486.	17530.	479.	o
2	4	24	42161.	38388.	505.	o
4	4	24	7533.	9950.	414.	o
1	5	24	2426.	2565.	151.	o
3	5	24	516.	1340.	146.	o
0	6	24	226473.	221148.	1857.	o
2	6	24	86743.	84546.	825.	o
4	6	24	58634.	57976.	762.	o
6	6	24	276730.	274967.	2432.	o
1	7	24	1843.	2336.	179.	o
3	7	24	365.	544.	140.	o
5	7	24	3409.	4160.	250.	o
0	8	24	135805.	131875.	1683.	o
2	8	24	10735.	11631.	367.	o
4	8	24	99347.	96999.	1077.	o
6	8	24	23353.	23287.	575.	o
8	8	24	17757.	17986.	708.	o
1	9	24	10924.	9482.	369.	o
3	9	24	7600.	7151.	341.	o
5	9	24	101.	460.	174.	<
7	9	24	8250.	6977.	367.	o
0	10	24	64971.	70247.	1400.	o

2	10	24	43637.	43190.	783.	o
4	10	24	25631.	26193.	656.	o
6	10	24	128598.	128483.	1384.	o
8	10	24	31060.	28714.	793.	o
1	11	24	53.	577.	200.	<
3	11	24	1.	611.	242.	<
5	11	24	3608.	3657.	312.	o
7	11	24	42.	42.	263.	<
0	12	24	273079.	273143.	3179.	o
2	12	24	32671.	32878.	879.	o
4	12	24	137553.	133555.	1764.	o
6	12	24	163173.	156575.	3309.	o
1	13	24	6650.	5921.	632.	o
3	13	24	7228.	5713.	799.	o
1	2	25	423583.	423009.	1295.	o
2	3	25	94663.	102308.	736.	o
1	4	25	168953.	161447.	970.	o
3	4	25	32806.	31752.	468.	o
2	5	25	385016.	386614.	1730.	o
4	5	25	178007.	170333.	1202.	o
1	6	25	124865.	125067.	1038.	o
3	6	25	21164.	21898.	455.	o
5	6	25	81589.	81672.	960.	o
2	7	25	8607.	8501.	289.	o
4	7	25	25254.	24003.	531.	o
6	7	25	5370.	5515.	286.	o
1	8	25	211434.	207132.	1582.	o
3	8	25	22835.	20535.	520.	o
5	8	25	174393.	171012.	1514.	o
7	8	25	9534.	10650.	416.	o
2	9	25	83040.	84746.	1093.	o
4	9	25	22958.	24172.	614.	o
6	9	25	35058.	32033.	702.	o
8	9	25	34449.	35399.	830.	o
1	10	25	4140.	5273.	297.	o
3	10	25	2823.	3283.	271.	o
5	10	25	4711.	5338.	328.	o
7	10	25	38371.	36523.	809.	o
2	11	25	45423.	48965.	981.	o
4	11	25	36405.	38437.	887.	o
6	11	25	2165.	2609.	289.	o
1	12	25	64087.	60653.	1119.	o
3	12	25	7586.	7320.	453.	o
5	12	25	48918.	48232.	1673.	o
2	13	25	164.	26.	473.	<
1	1	26	3597.	7060.	263.	o
0	2	26	7692.	9037.	291.	o
1	3	26	6139.	8028.	208.	o
3	3	26	150436.	139489.	1298.	o
0	4	26	1950.	2084.	192.	o
2	4	26	1456.	2297.	143.	o
1	5	26	42734.	44452.	570.	o
3	5	26	111421.	114964.	944.	o
5	5	26	548.	2424.	278.	o
0	6	26	121.	570.	211.	<
2	6	26	3629.	3933.	219.	o
4	6	26	266.	637.	140.	o
1	7	26	3688.	5884.	276.	o
3	7	26	14211.	14786.	408.	o
5	7	26	82573.	79804.	994.	o
7	7	26	7351.	7416.	455.	o

0	8	26	150.	229.	221.	<
2	8	26	1469.	1712.	185.	o
4	8	26	116.	117.	169.	<
6	8	26	33.	125.	174.	<
1	9	26	91717.	92530.	1077.	o
3	9	26	344630.	332608.	2232.	o
5	9	26	15211.	15780.	518.	o
7	9	26	146543.	148206.	1566.	o
9	9	26	136435.	138685.	3098.	o
0	10	26	1056.	1259.	276.	o
2	10	26	642.	702.	206.	o
4	10	26	71.	107.	213.	<
6	10	26	73.	-52.	208.	<
8	10	26	4.	-380.	403.	<
1	11	26	44835.	41866.	869.	o
3	11	26	72229.	67861.	1173.	o
5	11	26	10158.	10970.	507.	o
7	11	26	65364.	60200.	1995.	o
0	12	26	2722.	2765.	408.	o
2	12	26	38.	315.	299.	<
4	12	26	43.	10.	294.	<
1	13	26	33234.	37397.	1699.	o
1	2	27	379787.	366469.	1340.	o
2	3	27	55422.	52675.	544.	o
1	4	27	134118.	129963.	861.	o
3	4	27	4351.	5507.	221.	o
2	5	27	405162.	402781.	1758.	o
4	5	27	141922.	143381.	1132.	o
1	6	27	61122.	61836.	778.	o
3	6	27	51881.	50898.	747.	o
5	6	27	87970.	86552.	1015.	o
2	7	27	10297.	10663.	362.	o
4	7	27	16075.	17140.	484.	o
6	7	27	3900.	3897.	250.	o
1	8	27	145212.	142293.	1436.	o
3	8	27	20632.	20010.	546.	o
5	8	27	194409.	196669.	1717.	o
7	8	27	17362.	20928.	575.	o
2	9	27	64233.	65681.	1022.	o
4	9	27	15931.	16552.	549.	o
6	9	27	32515.	33230.	752.	o
8	9	27	23552.	24957.	710.	o
1	10	27	529.	1100.	192.	o
3	10	27	9773.	9469.	434.	o
5	10	27	2330.	2929.	291.	o
7	10	27	24419.	24276.	775.	o
2	11	27	55585.	56460.	1067.	o
4	11	27	45579.	47391.	999.	o
6	11	27	633.	1069.	330.	o
1	12	27	41282.	43200.	1002.	o
3	12	27	14836.	11815.	697.	o
0	0	28	27206.	26196.	832.	o
0	2	28	76247.	72965.	806.	o
2	2	28	7032.	9386.	336.	o
1	3	28	344.	809.	107.	o
0	4	28	4296.	5533.	268.	o
2	4	28	18278.	20642.	367.	o
4	4	28	5081.	7481.	354.	o
1	5	28	159.	377.	122.	o
3	5	28	3516.	4316.	211.	o
0	6	28	195664.	189848.	1876.	o

2	6	28	65103.	61813.	793.	o
4	6	28	90928.	89145.	989.	o
6	6	28	204377.	194965.	2279.	o
1	7	28	620.	702.	172.	o
3	7	28	843.	1111.	169.	o
5	7	28	1784.	1990.	198.	o
0	8	28	172684.	163154.	2055.	o
2	8	28	2146.	3629.	273.	o
4	8	28	83122.	81146.	1100.	o
6	8	28	24533.	23188.	596.	o
8	8	28	28394.	28625.	1043.	o
1	9	28	2649.	2268.	234.	o
3	9	28	3934.	4253.	307.	o
5	9	28	1923.	1738.	250.	o
7	9	28	6871.	5736.	336.	o
0	10	28	47446.	50081.	1228.	o
2	10	28	20153.	20348.	585.	o
4	10	28	12275.	13464.	510.	o
6	10	28	94274.	91786.	1288.	o
1	11	28	1228.	1184.	250.	o
3	11	28	4.	463.	234.	<
5	11	28	39.	453.	273.	<
0	12	28	253106.	259929.	4526.	o
2	12	28	30540.	29276.	1243.	o
1	2	29	169033.	168689.	949.	o
2	3	29	15853.	16833.	328.	o
1	4	29	76694.	74406.	705.	o
3	4	29	2953.	3293.	182.	o
2	5	29	226987.	227232.	1358.	o
4	5	29	96740.	95940.	926.	o
1	6	29	64627.	65595.	853.	o
3	6	29	5968.	6280.	284.	o
5	6	29	64999.	63707.	890.	o
2	7	29	79962.	75527.	1022.	o
4	7	29	60430.	60546.	929.	o
6	7	29	8304.	8036.	351.	o
1	8	29	72553.	73420.	1054.	o
3	8	29	478.	942.	216.	o
5	8	29	72938.	78636.	1106.	o
7	8	29	56353.	55687.	947.	o
2	9	29	59397.	58169.	1017.	o
4	9	29	13482.	13475.	499.	o
6	9	29	19497.	18756.	601.	o
8	9	29	7472.	8816.	583.	o
1	10	29	5773.	6613.	364.	o
3	10	29	4157.	4820.	336.	o
5	10	29	2000.	2846.	284.	o
7	10	29	25433.	25043.	1194.	o
2	11	29	104566.	103102.	1360.	o
4	11	29	55897.	56925.	1256.	o
1	12	29	10940.	13634.	1220.	o
1	1	30	44610.	46065.	692.	o
0	2	30	8306.	7195.	289.	o
1	3	30	85026.	83238.	715.	o
3	3	30	293855.	288234.	2094.	o
0	4	30	9.	427.	156.	<
2	4	30	6853.	7102.	245.	o
1	5	30	20311.	21308.	453.	o
3	5	30	32948.	32361.	525.	o
5	5	30	5781.	7341.	408.	o
0	6	30	25625.	21828.	663.	o

2	6	30	2.	377.	153.	<
4	6	30	11622.	10577.	362.	o
1	7	30	30631.	29276.	619.	o
3	7	30	78538.	77304.	1046.	o
5	7	30	17646.	17187.	489.	o
7	7	30	32679.	33984.	968.	o
0	8	30	5349.	4266.	406.	o
2	8	30	6860.	6360.	336.	o
4	8	30	968.	1152.	213.	o
6	8	30	6107.	5710.	336.	o
1	9	30	55133.	54631.	931.	o
3	9	30	178966.	180754.	1847.	o
5	9	30	9133.	8793.	421.	o
7	9	30	80956.	85415.	1493.	o
0	10	30	25354.	19375.	858.	o
2	10	30	1195.	1584.	263.	o
4	10	30	22223.	17122.	583.	o
6	10	30	1443.	1119.	299.	o
1	11	30	3783.	5707.	411.	o
3	11	30	3634.	5811.	424.	o
5	11	30	43.	908.	544.	<
0	12	30	5904.	5023.	1077.	o
1	2	31	101739.	95428.	767.	o
2	3	31	2410.	3093.	172.	o
1	4	31	105239.	102136.	897.	o
3	4	31	1662.	2856.	177.	o
2	5	31	58659.	58887.	765.	o
4	5	31	78617.	81001.	895.	o
1	6	31	159.	533.	156.	o
3	6	31	742.	1228.	161.	o
5	6	31	749.	989.	172.	o
2	7	31	9905.	11532.	421.	o
4	7	31	11295.	11977.	434.	o
6	7	31	71.	489.	185.	<
1	8	31	128741.	128603.	1436.	o
3	8	31	9021.	9888.	445.	o
5	8	31	129735.	127872.	1491.	o
7	8	31	22922.	26864.	702.	o
2	9	31	535.	1334.	252.	o
4	9	31	6983.	7416.	401.	o
6	9	31	3735.	3660.	325.	o
1	10	31	38184.	36021.	822.	o
3	10	31	849.	1426.	260.	o
5	10	31	53832.	50331.	1173.	o
2	11	31	33628.	38661.	1043.	o
4	11	31	38772.	41255.	1811.	o
0	0	32	669773.	652997.	6363.	o
0	2	32	49614.	52534.	851.	o
2	2	32	2567.	4430.	265.	o
1	3	32	1385.	1350.	135.	o
0	4	32	284196.	280180.	2019.	o
2	4	32	30801.	31593.	525.	o
4	4	32	102445.	101913.	1407.	o
1	5	32	1257.	1691.	177.	o
3	5	32	4093.	3985.	224.	o
0	6	32	380399.	371066.	2607.	o
2	6	32	44686.	46002.	726.	o
4	6	32	110642.	110580.	1181.	o
6	6	32	231316.	218869.	2367.	o
1	7	32	539.	1048.	192.	o
3	7	32	344.	744.	192.	o

5	7	32	1433.	1548.	206. o
0	8	32	6487.	7008.	559. o
2	8	32	106.	1571.	206. o
4	8	32	6450.	7044.	385. o
6	8	32	1676.	2807.	286. o
8	8	32	19858.	16628.	1290. o
1	9	32	6880.	5726.	330. o
3	9	32	9203.	7674.	421. o
5	9	32	1379.	1431.	258. o
7	9	32	7953.	6392.	536. o
0	10	32	184877.	186014.	2633. o
2	10	32	25078.	27109.	723. o
4	10	32	58778.	58502.	1262. o
1	11	32	258.	424.	284. <
3	11	32	6.	-57.	429. <
1	2	33	23875.	23659.	442. o
2	3	33	15257.	13561.	338. o
1	4	33	51668.	52747.	676. o
3	4	33	124.	619.	151. o
2	5	33	12984.	13256.	395. o
4	5	33	37574.	39041.	674. o
1	6	33	1443.	2440.	206. o
3	6	33	11810.	11121.	385. o
5	6	33	2042.	3096.	245. o
2	7	33	105170.	99840.	1262. o
4	7	33	37972.	36265.	780. o
6	7	33	28165.	26190.	635. o
1	8	33	39616.	39553.	817. o
3	8	33	586.	897.	211. o
5	8	33	36722.	36832.	853. o
7	8	33	59592.	56478.	1413. o
2	9	33	475.	882.	245. o
4	9	33	4767.	4917.	356. o
6	9	33	7613.	6615.	507. o
1	10	33	53318.	53117.	1085. o
3	10	33	5789.	6784.	471. o
5	10	33	46352.	46528.	1686. o
2	11	33	93389.	94231.	3059. o
1	1	34	130749.	130949.	1397. o
0	2	34	28.	486.	192. <
1	3	34	283214.	275682.	1621. o
3	3	34	433916.	444343.	2861. o
0	4	34	576.	1147.	198. o
2	4	34	9.	398.	138. <
1	5	34	422.	1800.	187. o
3	5	34	4111.	5143.	273. o
5	5	34	23210.	24044.	903. o
0	6	34	888.	843.	232. o
2	6	34	24.	198.	151. <
4	6	34	1020.	1204.	192. o
1	7	34	145578.	139968.	1457. o
3	7	34	285075.	283133.	2091. o
5	7	34	2953.	2968.	268. o
7	7	34	181574.	175263.	2549. o
0	8	34	783.	905.	325. <
2	8	34	34.	416.	211. <
4	8	34	58.	42.	229. <
6	8	34	1267.	1329.	276. o
1	9	34	32118.	32873.	853. o
3	9	34	65838.	73816.	1220. o
5	9	34	20176.	20660.	884. o

0	10	34	1883.	1082.	406.	<
2	10	34	87.	161.	310.	<
4	10	34	161.	211.	369.	<
1	2	35	7483.	8023.	291.	o
2	3	35	9784.	11300.	362.	o
1	4	35	25397.	24809.	531.	o
3	4	35	309.	1197.	156.	o
2	5	35	8004.	8972.	351.	o
4	5	35	31836.	31234.	640.	o
1	6	35	7352.	6821.	307.	o
3	6	35	9875.	9617.	385.	o
5	6	35	11550.	10991.	453.	o
2	7	35	97392.	93945.	1204.	o
4	7	35	37911.	34798.	754.	o
6	7	35	22660.	22296.	710.	o
1	8	35	28477.	29824.	788.	o
3	8	35	726.	1220.	237.	o
5	8	35	32599.	35701.	822.	o
2	9	35	8224.	7963.	455.	o
4	9	35	1139.	1855.	320.	o
1	10	35	65518.	62950.	1647.	o
3	10	35	4802.	3343.	528.	o
0	0	36	883564.	860131.	9672.	o
0	2	36	34385.	37126.	835.	o
2	2	36	2228.	3083.	304.	o
1	3	36	4062.	3517.	219.	o
0	4	36	420924.	407948.	3231.	o
2	4	36	25334.	27233.	617.	o
4	4	36	240017.	231098.	2653.	o
1	5	36	1231.	1285.	179.	o
3	5	36	2939.	2966.	252.	o
0	6	36	367480.	370337.	3028.	o
2	6	36	24074.	25751.	606.	o
4	6	36	125822.	123616.	1428.	o
6	6	36	185233.	187822.	2599.	o
1	7	36	2760.	2401.	237.	o
3	7	36	9.	380.	195.	<
5	7	36	2169.	1938.	263.	o
0	8	36	30639.	27390.	1004.	o
2	8	36	20.	739.	247.	<
4	8	36	29797.	26648.	713.	o
6	8	36	330.	1436.	445.	o
1	9	36	2798.	2739.	304.	o
3	9	36	1894.	1855.	367.	o
0	10	36	166184.	172706.	4178.	o
1	2	37	7469.	8834.	325.	o
2	3	37	6587.	5837.	302.	o
1	4	37	55606.	55115.	851.	o
3	4	37	47.	858.	200.	o
2	5	37	9895.	11207.	416.	o
4	5	37	51977.	50422.	994.	o
1	6	37	14427.	12921.	458.	o
3	6	37	4164.	4014.	291.	o
5	6	37	7083.	6488.	395.	o
2	7	37	34716.	36960.	864.	o
4	7	37	20733.	20569.	692.	o
6	7	37	5146.	5798.	536.	o
1	8	37	50156.	48029.	939.	o
3	8	37	1375.	1816.	271.	o
5	8	37	74976.	70600.	2271.	o
2	9	37	4510.	3457.	442.	o

1	1	38	58263.	58064.	1152.	o
0	2	38	966.	1059.	239.	o
1	3	38	122286.	122986.	1295.	o
3	3	38	282520.	272889.	2700.	o
0	4	38	1785.	1826.	310.	o
2	4	38	111.	390.	192.	<
1	5	38	2732.	3062.	247.	o
3	5	38	5204.	6365.	375.	o
5	5	38	4560.	5213.	515.	o
0	6	38	8638.	6256.	484.	o
2	6	38	131.	523.	216.	<
4	6	38	672.	879.	258.	o
1	7	38	60227.	58361.	1056.	o
3	7	38	134296.	136029.	1608.	o
5	7	38	964.	2461.	429.	o
0	8	38	6527.	4760.	481.	o
2	8	38	1684.	1103.	271.	o
4	8	38	1943.	1657.	429.	o
1	9	38	29503.	32093.	1087.	o
1	2	39	53771.	54969.	832.	o
2	3	39	327.	923.	182.	o
1	4	39	29017.	31950.	713.	o
3	4	39	49.	1225.	219.	o
2	5	39	63310.	61407.	1085.	o
4	5	39	38885.	39210.	926.	o
1	6	39	12107.	11659.	486.	o
3	6	39	461.	1236.	258.	o
5	6	39	4980.	4552.	424.	o
2	7	39	45830.	41840.	947.	o
4	7	39	35098.	32366.	1210.	o
1	8	39	29640.	34972.	1145.	o
3	8	39	1100.	931.	741.	<
0	0	40	140184.	144892.	4126.	o
0	2	40	48864.	47664.	1129.	o
2	2	40	5400.	5655.	421.	o
1	3	40	1814.	1805.	226.	o
0	4	40	36815.	36676.	1171.	o
2	4	40	8311.	9089.	416.	o
4	4	40	4977.	6056.	554.	o
1	5	40	216.	388.	206.	<
3	5	40	2233.	1696.	268.	o
0	6	40	109626.	118390.	2154.	o
2	6	40	30722.	30493.	835.	o
4	6	40	39470.	42662.	1288.	o
1	7	40	2396.	2248.	333.	o
3	7	40	118.	-591.	380.	<
0	8	40	21955.	20527.	1376.	o
2	8	40	474.	570.	559.	<
1	2	41	114834.	114771.	1254.	o
2	3	41	7346.	7528.	395.	o
1	4	41	55035.	53205.	970.	o
3	4	41	1775.	2276.	260.	o
2	5	41	125480.	123957.	1571.	o
4	5	41	61440.	59110.	1111.	o
1	6	41	16738.	16219.	611.	o
3	6	41	4844.	4625.	484.	o
2	7	41	4933.	6238.	656.	o
1	1	42	1508.	1259.	273.	o
0	2	42	15.	965.	310.	o
1	3	42	1604.	3543.	294.	o
3	3	42	54622.	56949.	1623.	o

0	4	42	356.	68.	284.	<
2	4	42	182.	624.	211.	<
1	5	42	22793.	22489.	744.	o
3	5	42	40687.	38367.	1119.	o
0	6	42	79.	-957.	510.	<
2	6	42	63.	-44.	356.	<
1	2	43	135292.	128920.	1556.	o
2	3	43	27363.	24827.	749.	o
1	4	43	35093.	34894.	910.	o
3	4	43	3865.	3684.	356.	o
2	5	43	177918.	168486.	2661.	o
1	6	43	42130.	40607.	1556.	o
0	0	44	9215.	15200.	1506.	o
0	2	44	22427.	23467.	965.	o
2	2	44	11256.	11664.	762.	o
1	3	44	399.	658.	247.	<
0	4	44	3085.	2302.	445.	o
2	4	44	4179.	4628.	468.	o
1	5	44	2.	-44.	419.	<
1	2	45	92159.	89949.	1561.	o
2	3	45	13820.	12395.	721.	o
1	4	45	29399.	31234.	1204.	o
1	1	46	228.	528.	538.	<
0	2	46	3256.	2752.	567.	o
1	3	46	10453.	13478.	1178.	o