



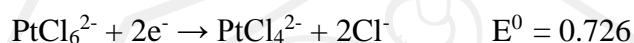
APPENDICES

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APPENDIX A

The Standard Reduction Potentials from [http://en.wikipedia.org/wiki/Standard_electrode_potential_\(data_page\)#cite_note-Bar2-12](http://en.wikipedia.org/wiki/Standard_electrode_potential_(data_page)#cite_note-Bar2-12) (30/8/2013)



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APPENDIX B

Joint committee on powder diffraction standard

Name and formula

Reference code: 00-008-0415
Mineral name: Graphite
PDF index name: Carbon
Empirical formula: C
Chemical formula: C

Crystallographic parameters

Crystal system: Hexagonal
Space group: P63/mmc
Space group number: 194
a (?): 2.4640
b (?): 2.4640
c (?): 6.7360
Alpha (?): 90.0000
Beta (?): 90.0000
Gamma (?): 120.0000
Volume of cell (10⁶ pm³): 35.42
Z: 4.00
RIR: -

Status, subfiles and quality

Status: Marked as deleted by ICDD
Subfiles: Inorganic
Mineral
Quality: Blank (B)

Comments

Deleted by: Post June 10, 1960; SW October 31, 1960 (for Set 13).
General comments: Spectrographically pure reagent.
Temperature: Pattern taken at 25 C.

References

Primary reference: Menary, African Expl. Chem. Ind. Ltd., Transvaal, Africa., *Private Communication*

Peak list

No.	h	k	l	d [Å]	2Theta[deg]	I [%]
1	0	0	2	3.37000	26.426	100.0
2	1	0	0	2.13200	42.361	2.0
3	1	0	1	2.03600	44.462	3.0
4	0	0	4	1.68200	54.512	8.0
5	1	0	3	1.54100	59.983	2.0
6	1	1	0	1.23200	77.400	2.0

Name and formula

Reference code: 00-005-0681

Mineral name: Palladium, syn

PDF index name: Palladium

Empirical formula: Pd

Chemical formula: Pd

Crystallographic parameters

Crystal system: Cubic

Space group: Fm3m

Space group number: 225

a (?): 3.8898

b (?): 3.8898

c (?): 3.8898

Alpha (?): 90.0000

Beta (?): 90.0000

Gamma (?): 90.0000

Volume of cell (10⁶ pm³): 58.85

Z: 4.00

RIR: -

Status, subfiles and quality

Status: Marked as deleted by ICDD
 Subfiles: Inorganic
 Mineral
 Alloy, metal or intermetallic
 Common Phase
 Educational pattern
 Forensic
 NBS pattern
 Quality: Star (S)

Comments

Deleted by: Deleted by 46-1043; F_N is higher, Mayo 11/94.
 Color: Black
 Sample source: Sample from Johnson Matthey Company, Ltd.
 Analysis: Spectroscopic analysis shows <0.1% Ag, Si; <0.01%
 Ca, Cu, Mg, Pt; 0.0001% Pb.
 Temperature: Pattern taken at 26 C.

References

Primary reference: Swanson, Tatge., *Natl. Bur. Stand. (U.S.), Circ. 539, I*,
 21, (1953)

Peak list

No.	h	k	l	d [Å]	2Theta[deg]	I [%]
1	1	1	1	2.24600	40.115	100.0
2	2	0	0	1.94500	46.662	42.0
3	2	2	0	1.37600	68.085	25.0
4	3	1	1	1.17300	82.096	24.0
5	2	2	2	1.12320	86.598	8.0
6	4	0	0	0.97230	104.792	3.0
7	3	3	1	0.89240	119.351	13.0
8	4	2	0	0.86970	124.677	11.0

Name and formula

Reference code: 00-001-1190

PDF index name: Platinum

Empirical formula: Pt

Chemical formula: Pt

Crystallographic parameters

Crystal system: Cubic

Space group: Fm3m

Space group number: 225

a (?): 3.9120

b (?): 3.9120

c (?): 3.9120

Alpha (?): 90.0000

Beta (?): 90.0000

Gamma (?): 90.0000

Measured density (g/cm³): 21.51Volume of cell (10⁶ pm³): 59.87

Z: 4.00

RIR: -

Status, subfiles and quality

Status: Marked as deleted by ICDD

Subfiles: Inorganic

Quality: Blank (B)

Comments

Deleted by: Deleted by NBS card.

Color: Tin white

Melting point: 1773.5

ReferencesPrimary reference: Davey., *Phys. Rev.*, **25**, 753, (1925)Optical data: *Data on Chem. for Cer. Use, Natl. Res. Council Bull.*
107

Unit cell:

*The Structure of Crystals, 1st Ed.***Peak list**

No.	h	k	l	d [Å]	2Theta[deg]	I [%]
1	1	1	1	2.27000	39.673	100.0
2	2	0	0	1.96000	46.284	86.0
3	2	2	0	1.39000	67.307	86.0
4	3	1	1	1.18000	81.506	100.0
5	2	2	2	1.13000	85.950	57.0
6	4	0	0	0.98000	103.630	28.0
7	3	3	1	0.90000	117.716	71.0
8	4	2	0	0.88000	122.171	71.0
9	4	2	2	0.80000	148.678	57.0
10	5	1	1	0.75000		43.0

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APPENDIX C

The camera constant method

The radius of each ring is characteristic of the spacing of the reflecting planes in the crystal and the magnification settings of the microscope lenses.

Procedure for indexing ring patterns is as follows:

1. When the identity of the material is known, we have the following:

1.1 Measure the ring radius.

1.2 Convert the distances into interplanar spacings using the camera constant defined as $rd_{hkl} = \lambda L$. Any radius, r , which we measure on the diffraction pattern is related to the specific spacing in the crystal, d_{hkl} . Since λL is a camera constant ($\lambda L = 24.9630 \text{ mm}\cdot\text{\AA}$), measure several values of r and d_{hkl} ($d_{hkl} = \lambda L/r$) for example:

$$r_1 = 11.2 \text{ mm}, d_{111} = 24.9630/11.2 = 2.2288$$

$$r_2 = 12.9 \text{ mm}, d_{200} = 24.9630/12.9 = 1.9351$$

$$r_3 = 17.8 \text{ mm}, d_{220} = 24.9630/17.8 = 1.4024$$

$$r_4 = 20.9 \text{ mm}, d_{311} = 24.9630/20.9 = 1.1944$$

$$r_5 = 21.8 \text{ mm}, d_{222} = 24.9630/21.8 = 1.1451$$

$$r_6 = 28.2 \text{ mm}, d_{420} = 24.9630/28.2 = 0.8852$$

1.3 Check the ratios against a table of ratios of the interplanar spacings for the crystal structure of interest, see joint committee on powder diffraction standard of palladium crystal system.

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M.Sc. (Chemistry) Chiang Mai University, Thailand, 2012

International Published

1. Electrochemical deposition of precious metal on carbon nanotube for methanol oxidation, S. Saipanya, T. Sarakonsri and P. Wongtap, *Materials Research Bulletin*, 47(10) 2012 2765-2766 (Impact Factor 1.91)

International Conference:

1. Electrochemical Deposition of Platinum on Gold Nanoparticles on Carbon Nanotube for Ethanol Oxidation, the 7th Pure and Applied Chemistry International Conference 2013, 23-25 January 2013, Bangsaen Beach, Thailand