PHYSICAL / INORGANIC CHEMISTRY

DPP
DAILY PRACTICE PROBLEMS

DPP No. 55

Total Marks : 29

Max. Time : 31 min.

Topic : Metallurgy

Type of Questions		M.M., Min.
Single choice Objective ('–1' negative marking) Q.1 to Q.7	(3 marks 3 min.)	[21, 21]
Match the Following (no negative marking) Q.8	(8 marks 10 min.)	[8, 10]

1. **(a)** Mg metal is extracted from

(A) Cryolite (B) Carnallite (C) Malachite (D) Cassiterite

(b) Match correctly

I	Bauxite	(a)	Lead
II	Carnallite	(b)	Copper
III	Malachite	(c)	Magnesium
IV	Galena	(d)	Hall Process

(A) I – a, II – b, III – c, IV – d (B) I – d, II – c, III – b, IV – a

(C) I – b, II – a, III – d, IV – c (D) I – d, II – b, III – c, IV – a

2. **(a)** Copper is extracted from :

(A) stefinite (B) dolomite (C) galena (D) malachite

(b) Corundum is :

(A) ZnO (B) Al_2O_3 (C) Fe_3O_4 (D) Ag_2O

3. **(a)** Important ore of Zinc is :

(A) calamine (B) magnetite (C) cryolite (D) Anglesite

(b) Which of the following ores is concentrated by magnetic separation method ?

(A) Bauxite (B) Haematite (C) Argentite (D) Dolomite

4. **(a)** Which of the following processes is used for the concentration of ores ?

(A) Bessemerisation (B) Electrolytic reduction

(C) Froth floatation process (D) Smelting

(b) When lime stone is heated, CO_2 gas is liberated. In metallurgy, this process is called as :

(A) calcination (B) roasting (C) ore dressing (D) sublimation

5. **(a)** Main function of frothers is:

(A) Stick to the ore and then take it to rise upto the top

(B) Convert the insoluble ore into soluble part

(C) Make the ore hydrophobic

(D) None

(b) Main function of the collectors in metallurgy is :

(A) Stick to the ore and then take it to rise upto the top

(B) Convert the insoluble ore into soluble part

(C) Make the ore hydrophobic

(D) None

6. **(a)** A metal obtained by a hydrometallurgical operation is :

(A) Silver (B) Iron (C) Tin (D) Aluminium

(b) When haematite ore is burnt in air with coke along with lime at 200°C, the process not only produces steel but also produces an important compound (A), which is useful in making building materials. The compound (A) is

(A) SiO_2 (B) $CaSiO_3$ (C) FeO (D) Fe_2O_3

7. **(a)** The substance which is used as flux in the extraction of iron from haematite ore is :

(A) silica (B) borax (C) lime stone (D) salt cake

(b) (i) The slag obtained during the extraction is lighter and has lower melting point than the metal (Fe or Cu).

(ii) Froth floatation process may be used to increase the concentration of mineral chalcopyrites.

(iii) High purify metals can be obtained by zone refining method if the impurity has lower melting point.

(A) T, T, T (B) T, F, T (C) F, T, T (D) F, F, F

8. Match the ionization processes listed in column-I with the changes observed as listed in column-II. For this use the codes given below :

Column-I	**Column-II**
(A) $N_2 \longrightarrow N_2^+$	(p) Bond order increases and magnetic property is changed
(B) $O_2^+ \longrightarrow O_2^{2+}$	(q) Bond order decreases and magnetic property is not changed
(C) $B_2 \longrightarrow B_2^+$	(r) Bond order increases and magnetic property is not changed
(D) $NO^- \longrightarrow NO$	(s) Bond order decreases and magnetic property is changed
	(t) Bond energy decreases and bond length increases.

Note : Here change in magnetic property refers to change from diamagentic to paramagentic or paramagnetic to diamagnetic.

Answer Key

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1.	**(a)** (B)	**(b)** (B)	2.	**(a)** (D)	**(b)** (B)	3.	**(a)** (A)	**(b)** (B)	4. **(a)** (C) **(b)** (A)
5.	**(a)** (A)	**(b)** (C)	6.	**(a)** (A)	**(b)** (B)	7.	**(a)** (C)	**(b)** (A)	8. (A - s, t) ; (B - p) ; (C - q, t) ; (D - r)

Hints & Solutions

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1. **(a)** (A) Cryolite is Na_3AlF_6; (B) Carnallite is $MgCl_2.KCl.6H_2O$.
(C) Malachite is $CuCO_3 . Cu(OH)_2$; (D) Cassiterite is SnO_2

(b) Bauxite - $A\ell_2O_3 . 2H_2O$ - $A\ell$ is extracted by Hall's process
Carnallite - $MgC\ell_2 . KC\ell . 6H_2O$
Malachite - $CuCO_3 . Cu(OH)_2$
Galena - PbS

2. **(a)** $CuCO_3Cu(OH)_2 \xrightarrow{\Delta} CuO + CO_2 + H_2O$; $CuO + C \longrightarrow Cu + CO$

3. **(a)** Calamine is $ZnCO_3$.
(b) Haematite is Fe_2O_3 which has magnetic property.

4. **(a)** Froth floatation process is used for the concentration of the sulphide ores of zinc, copper, lead, etc.
(b) Conversion of carbonate ore in to oxide on heating in absence of air is called calcination.

6. **(a)** Extraction of silver is not a high temperature operation like most metals and is done by the cyanide process in water solution.

(b) $CaCO_3 \longrightarrow CaO + CO_2$; $CaO + SiO_2 \longrightarrow CaSiO_3$

7. **(a)** $CaCO_3 \xrightarrow{\Delta} CaO + CO_2$

8. (A) $N_2 = \sigma1s^2\ \sigma^*1s^2\ \sigma2s^2\ \sigma^*2s^2\ \pi2p_x^2 = \pi2p_y^2\ \sigma2p_z^2$

$$B.O. = \frac{10-4}{2} = 3 ; \quad n = 0 \text{ (D)}$$

$N_2^+ = \sigma1s^2\ \sigma^*1s^2\ \sigma2s^2\ \sigma^*2s^2\ \pi2p_x^2 = \pi2p_y^2\ \sigma2p_z^1$

$$B.O. = \frac{9-4}{2} = 2.5 ; \quad n = 1 \text{ (P)}$$

(B) $O_2^+ = \sigma1s^2\ \sigma^*1s^2\ \sigma2s^2\ \sigma^*2s^2\ \sigma2p_z^2\ \pi2p_x^2 = \pi2p_y^2\ \pi^*2p_x^1 = \pi^*2p_y^0$

$$B.O. = \frac{10-5}{2} = 2.5 ; \quad n = 1 \text{ (P)}$$

$O_2^{2+} = \sigma1s^2\ \sigma^*1s^2\ \sigma2s^2\ \sigma^*2s^2\ \sigma2p_z^2\ \pi2p_x^2 = \pi2p_y^2\ \pi^*2p_x^0 = \pi^*2p_y^0$

$$B.O. = \frac{10-4}{2} = 3 ; \quad n = 0 \text{ (D)}$$

(C) $B_2 = \sigma1s^2\ \sigma^*1s^2\ \sigma2s^2\ \sigma^*2s^2\ \pi2p_x^1 = \pi2p_y^1$

$$B.O. = \frac{6-4}{2} = 1 ; \quad n = 2 \text{ (P)}$$

$B_2^+ = \sigma1s^2\ \sigma^*1s^2\ \sigma2s^2\ \sigma^*2s^2\ \pi2p_x^2 = \pi2p_y^1\ \sigma2p_z^0$

$$B.O. = \frac{5-4}{2} = 1/2 ; \quad n = 1 \text{ (P)}$$

(D) $NO^- = \sigma1s^2\ \sigma^*1s^2\ \sigma2s^2\ \sigma^*2s^2\ \sigma2p_z^2\ \pi2p_x^2 = \pi2p_y^2\ \pi^*2p_x^1 = \pi^*2p_y^1$

$$B.O. = \frac{10-6}{2} = 1.0 ; \quad n = 2 \text{ (P)}$$

$NO = \sigma1s^2\ \sigma^*1s^2\ \sigma2s^2\ \sigma^*2s^2\ \sigma2p_z^2\ \pi2p_x^2 = \pi2p_y^2\ \pi^*2p_x^1 = \pi^*2p_y^0$

$$B.O. = \frac{10-5}{2} = 2.5 ; \quad n = 1 \text{ (P)}.$$