DPP - Daily Practice Problems

Name :

Date :

Start Time :

End Time :

CHEMISTRY 39

SYLLABUS : Extraction of Metals- II : Reduction to free Metals, Refining of Crude Metals

Max. Marks : 120   Time : 60 min.

GENERAL INSTRUCTIONS

- The Daily Practice Problem Sheet contains 30 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.
- You have to evaluate your Response Grids yourself with the help of solution booklet.
- Each correct answer will get you 4 marks and 1 mark shall be deduced for each incorrect answer. No mark will be given/deducted if no bubble is filled. Keep a timer in front of you and stop immediately at the end of 60 min.
- The sheet follows a particular syllabus. Do not attempt the sheet before you have completed your preparation for that syllabus. Refer syllabus sheet in the starting of the book for the syllabus of all the DPP sheets.
- After completing the sheet check your answers with the solution booklet and complete the Result Grid. Finally spend time to analyse your performance and revise the areas which emerge out as weak in your evaluation.

DIRECTIONS (Q.1-Q.21) : There are 21 multiple choice questions. Each question has 4 choices (a), (b), (c) and (d), out of which ONLY ONE choice is correct.

Q.1 General method for the extraction of metal from oxide ore is
  - (a) Carbon reduction
  - (b) Reduction by aluminium
  - (c) Reduction by hydrogen
  - (d) Electrolytic reduction

Q.2 Alumino-thermite process is used for the extraction of metals whose oxides are
  - (a) Fusible
  - (b) Not easily reduced by carbon
  - (c) Not easily reduced by hydrogen
  - (d) Strongly basic

Q.3 Which of the following metals can be extracted by electrolytic reduction process ?
  - (a) Pb
  - (b) Al
  - (c) Hg
  - (d) Zn

Q.4 Which technique is used in the manufacture of aluminium from bauxite ?
  - (a) Reduction with magnesium
  - (b) Reduction with coke
  - (c) Electrolytic reduction
  - (d) Reduction with iron

RESPONSE GRID   1. ⓐⓑⓒⓓ   2. ⓐⓑⓒⓓ   3. ⓐⓑⓒⓓ   4. ⓐⓑⓒⓓ

Space for Rough Work

Q.5 After partial roasting, the sulphide of copper is reduced by
(a) Reduction by carbon   (b) Electrolysis
(c) Self-reduction   (d) Cyanide process

Q.6 In order to refine "blister copper" it is melted in a furnace and is stired with green logs of wood. The purpose is
(a) To expel the dissolved gases in blister copper
(b) To bring the impurities to surface and oxidize them
(c) To increase the carbon content of copper
(d) To reduce the metallic oxide impurities with hydrocarbon gases librcted from the wood

Q.7 To obtain chromium from chromic oxide (Cr_2O_3), the method used is
(a) Alumino-thermite process
(b) Electrolytic reduction
(c) Carbon reduction
(d) Carbon monoxide reduction

Q.8 Heating with carbon in absence of air is known as
(a) Reduction   (b) Carbon-reduction
(c) Smelting   (d) Roasting

Q.9 Cupellation process is used in the metallugry of
(a) Copper   (b) Silver
(c) Aluminium   (d) Iron

Q.10 Metals are
(a) Electropositive   (b) Electronegative
(c) Acceptor of electrons (d) None of these

Q.11 In electrolytic refining, the impure metal is used to make
(a) Cathode   (b) Anode
(c) Electrolytic bath   (d) None of these

Q.12 Electrolytic refining is used for refining of
(a) Cu   (b) Au
(c) Ge   (d) Ag

Q.13 Van Arkel method of purification of metals involves converting the metal to a
(a) Volatile stable compound
(b) Volatile unstable compound
(c) Non volatile stable compound
(d) None of the above

Q.14 Zone refining is a method to obtain
(a) Very high temperature (b) Ultra pure Al
(c) Ultra pure metals   (d) Ultra pure oxides

Q.15 Which one of the following is manufactured by the electrolysis of fused sodium chloride?
(a) NaOH   (b) NaClO
(c) Na   (d) $NaClO_3$

Q.16 A metal which is refined by poling is
(a) Sodium   (b) Blister copper
(c) Zinc   (d) Silver

Q.17 Silver obtained from argentiferrous lead containing lead impurity is purified by
(a) Distillation   (b) Froth floatation
(c) Cupellation   (d) Treatment of KCN

Q.18 Mond's process is used for preparing
(a) Ni   (b) H_2SO_4
(c) NH_3 (d) HNO_3

Q.19 Gold is extracted by hydromctallurgical process based on its property
(a) of being electropositive
(b) of being less reactive
(c) to form complexes which are water soluble
(d) to form salts which are water soluble

RESPONSE GRID	5. ⓐⓑⓒⓓ	6. ⓐⓑⓒⓓ	7. ⓐⓑⓒⓓ	8. ⓐⓑⓒⓓ	9. ⓐⓑⓒⓓ
	10.ⓐⓑⓒⓓ	11.ⓐⓑⓒⓓ	12.ⓐⓑⓒⓓ	13.ⓐⓑⓒⓓ	14.ⓐⓑⓒⓓ
	15.ⓐⓑⓒⓓ	16.ⓐⓑⓒⓓ	17.ⓐⓑⓒⓓ	18.ⓐⓑⓒⓓ	19.ⓐⓑⓒⓓ

Space for Rough Work

Q.20 Pb and Sn are extracted from their chief ore respectively by

(a) Carbon reduction and self-reduction

(b) Self reduction and carbon reduction

(c) Electrolysis and self-reduction

(d) Self reduction and electrolysis

Q.21 During the process of electrolytic refining of copper, some metals present as impurity settle as 'anode mud'. These are

(a) Fe and Ni   (b) Ag and Au

(c) Pb and Zn   (d) Sn and Ag

DIRECTIONS (Q.22-Q.24) : In the following questions, more than one of the answers given are correct. Select the correct answers and mark it according to the following codes:

Codes :

(a) 1, 2 and 3 are correct   (b) 1 and 2 are correct

(c) 2 and 4 are correct   (d) 1 and 3 are correct

Q.22 Chemical reduction is suitable for converting

(1) Zinc oxide into zinc   (2) Cuprite into copper

(3) Haematite into iron   (4) Bauxite into aluminium

Q.23 Of the following, which can be obtained by electrolysis of the aqueous solution of their salts?

(1) Ag   (2) Cr

(3) Cu   (4) Mg and Al

Q.24 Which of the following are wrongly matched?

(1) Galena : Mg_2CO_3

(2) Cassiterite : $CaCO_3 MgCO_3$

(3) Dolomite : SnO_2

(4) Magnesite : $MgCO_3$

Magnesium mainly occurs in sea water in the combined form. About 1.3 g of magnesium is present per kilogram of sea water. For its extraction from sea water, sea water is concentrated using solar energy (i.e., by heat of sun light). It is then treated with slaked lime to get $Mg(OH)_2$. The $Mg(OH)_2$ so obtained is treated with HCl when $MgCl_2$ is produced. From $MgCl_2$, Mg is obtained by process of electrolysis. It can thus be easily seen that various processes such as precipitation, acid-base reaction and redox reactions are used in extraction of magnesium from sea water.

Q.25 In the extraction of magnesium from sea water the precipitation reaction occurs when

(a) Sodium carbonate is added to sea water to get magnesium carbonate

(b) Calcium hydroxide is added to get magnesium hydroxide

(c) Sodium sulphate is added to get magnesium sulphate

(d) Sodium chloride is added to get magnesium chloride

Q.26 In this process of extraction of magnesium from sea water the acid-base reaction occurs when

(a) $Mg(OH)_2$ reacts with HCl

(b) $MgCl_2$ is dissolved in water

(c) $MgCl_2$ is subjected to electrolysis

(d) $Ca(OH)_2$ is added to sea water

Q.27 In the process of extraction of Mg from sea water, redox reaction occurs when

(a) $Mg(OH)_2$ is converted to $MgCl_2$

(b) $MgCl_2$ is electrolysed

(c) when slaked lime is added to sea water

(d) none of the above

RESPONSE GRID	20.ⓐⓑⓒⓓ	21.ⓐⓑⓒⓓ	22.ⓐⓑⓒⓓ	23.ⓐⓑⓒⓓ	24.ⓐⓑⓒⓓ
	25.ⓐⓑⓒⓓ	26.ⓐⓑⓒⓓ	27.ⓐⓑⓒⓓ		

Space for Rough Work

Each of these questions contains two statements: Statement-1 (Assertion) and Statement-2 (Reason). Each of these questions has four alternative choices, only one of which is the correct answer. You have to select the correct choice.

(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.

(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.

(c) Statement -1 is False, Statement-2 is True.

(d) Statement -1 is True, Statement-2 is False.

Q.28 Statement-1 : Wolframite impurities are separated from cassiterite by electromagnetic separation.

Statement-2 : Cassiterite being magnetic is attracted by the magnet and forms a separate heap.

Q.29 Statement-1 : Lead, tin and bismuth are purified by liquation method.

Statement-2 : Lead, tin and bismuth have low m.p. as compared to impurities.

Q.30 Statement-1 : Gold is recovered from its solution containing aurocyanide complex by adding zinc dust.

Statement-2 : Zinc is more electropositive than gold.

RESPONSE GRID	28.ⓐⓑⓒⓓ	29.ⓐⓑⓒⓓ	30.ⓐⓑⓒⓓ

DAILY PRACTICE PROBLEM SHEET 39 - CHEMISTRY

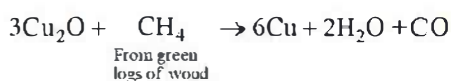| Total Questions	30	Total Marks	120
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	40	Qualifying Score	60
Success Gap = Net Score − Qualifying Score			
Net Score = (Correct × 4) − (Incorrect × 1)			

Space for Rough Work

| DAILY PRACTICE PROBLEMS | CHEMISTRY SOLUTIONS | (39) |

1. (a)

2. (b) Alumino thermite process involves reduction of oxides such as Fe_2O_3, Mn_3O_4, Cr_2O_3 etc to metals with aluminum. $Cr_2O_3 + 2Al \rightarrow Al_2O_3 + 2Cr$

3. (b) Al is highly electropositive. It can be obtained by electrolytic reduction.

4. (c) Electrolytic reduction-Hall and Heroult process.

5. (c) Self reduction:- Reduction of oxide ore of a metal by its own sulphide $2Cu_2O + Cu_2S \rightarrow 6Cu + SO_2$

6. (d) $2Cu_2S + 3O_2 \rightarrow 2Cu_2O + 2SO_2$

$$3Cu_2O + \underset{\substack{\text{From green} \\ \text{logs of wood}}}{CH_4} \rightarrow 6Cu + 2H_2O + CO$$

7. (a) $Cr_2O_3 + 2Al \rightarrow Al_2O_3 + 2Cr$

8. (b) Heating with carbon in absence of air is known as carbon reduction. It is used in metal of iron.

$$Fe_2O_3 + 3C \xrightarrow{\text{in blast furnace}} Fe + 3CO$$

9. (b) Cupellation method is used when the impure metals contain impurity of another metal which forms volatile oxide.

10. (a) Metals are electropositive elements because they have tendency to loose e^- and form +ve ions
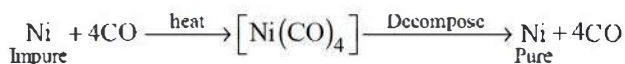$$Na \rightarrow Na^+ + e^-$$

11. (b) Impure metal as anode and pure metal as cathode.

12. (a) Electrolytic refining is used for refining of Cu.

13. (a) $$Ti + 2I_2 \xrightarrow{500K} \underset{\substack{\text{Volatile} \\ \text{Stable compound}}}{TiI_4} \xrightarrow{1700K} \underset{\text{Pure metal}}{Ti + 2I_2}$$
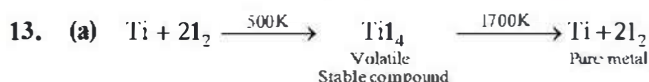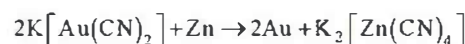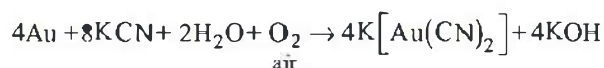
14. (c) Zone refining is employed for preparing extermely pure metals. It is based on the principle that when a molten solution of the impure metal is allowed to cool the pure metal crystallises out while the impurities remain in the melt.
Ex : Semiconductors like Si, Ge and Ga are purified by this method.

15. (c) $$\underset{\text{(fused)}}{2NaCl} \rightarrow 2Na^+ + 2Cl^-$$
Anode: $2Cl^- \rightarrow 2e^- + Cl_2$ (oxidation)
Cathode: $2Na^+ + 2e^- \rightarrow 2Na$ (reduction)

16. (b) Poling is used for purification of metals which contain their own oxide as impurity, e.g. Cu_2O in Cu; SnO_2 in Sn

17. (c) **Cupellation :** If metal possess the impurity of another metal which forms volatile oxide. Then cupellation method is used.

18. (a) Mond's process
$$\underset{\text{Impure}}{Ni} + 4CO \xrightarrow{\text{heat}} \left[Ni(CO)_4\right] \xrightarrow{\text{Decompose}} \underset{\text{Pure}}{Ni} + 4CO$$

19. (c) Hydrometallurgy is the process of dissolving the metal or its ore by the action of a suitable chemical reagent followed by recovery of the metal either by electrolysis or by the use of a suitable precipitating agent.

$$4Au + 8KCN + 2H_2O + \underset{\text{air}}{O_2} \rightarrow 4K\left[Au(CN)_2\right] + 4KOH$$

$$2K\left[Au(CN)_2\right] + Zn \rightarrow 2Au + K_2\left[Zn(CN)_4\right]$$

20. (b) PbO & $PbSO_4$ get reduced by PbS itself which is already present in mixture the reduction took place by mixture itself, it is known as self reduction.

$$2PbO + PbS \xrightarrow{\Delta} 3Pb + SO_2 \uparrow$$

$$PbSO_4 + PbS \xrightarrow{\Delta} 2Pb + 2SO_2 \uparrow$$

$$SnO_2 + 2C \longrightarrow Sn + 2CO$$

21. (b) During the process of electrolytic refining Ag and Au are obtained as anode mud.

22. (a) Chemical reduction is not suitable for converting bauxite into aluminium because Al is a strong reducing agent. It has strong affinity with oxygen than carbon.

23. (a) Ag, Cu and Cr can be obtained by electrolysis of the aqueous solution of their salts. But Mg and Al cannot be obtained by the electrolysis of aqueous solution of their salts because instead of metal, H_2 gas is liberated at cathode.

24. (a) $MgCO_3$ is the formula of magnesite hence it is only correct match and other three are wrongly matched.

25. (b) Calcium hydroxide is slaked lime and added to get magnesium hydroxide as precipitate.

26. (a) $$\underset{\text{(base)}}{Mg(OH)_2} + \underset{\text{(acid)}}{2HCl} \longrightarrow MgCl_2 + 2H_2O$$
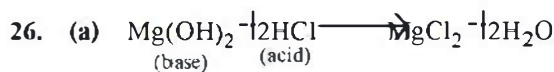
27. (b) When fused $MgCl_2$ is electrolysed, the process involved is a redox process.

28. (d) Assertion is true but reason is false.
Wolframite being magnetic is attracted by the magnetic roller and forms a heap under it.

29. (a) Both assertion and reason are true and reason is the correct explanation of assertion.
Liquation process is based on the difference in fusibility of the metal and impurities. When the impurities are less fusible than the metal itself, the process is employed.

30. (a) Au is recovered from the solution by the addition of electropositive metal.

$$2NaAu(Cu)_2 + Zn \rightarrow \underset{\text{Soluble complex}}{Na_2Zn(CN)_4} + 2Au \downarrow$$