

7. HEAVY METALS- COPPER- SQS

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Occurrence

1. Write down the molecular formula of copper pyrite. 0.5
2. Name two important ores of copper with their formula. 1

Extraction of copper from copper pyrites

3. What is meant by copper matte? 1
4. Starting from copper pyrite, how would you obtain pure copper? Explain the steps involved in the process with the necessary diagram. 7
5. How is blister copper extracted from copper pyrite? 6
6. How is pure copper extracted from copper pyrite? Discuss its metallurgical operations with necessary chemical reactions and diagrams. 10
7. How is metal copper extracted from its ore? How is it refined? 7+3
8. How is blister copper extracted from concentrated copper pyrite ore? How is it refined electrolytically? 8+2
Write a short note on: Extraction of blister copper from copper pyrites. 5
Write a short note on: Extraction of copper from copper pyrites. 5
How is metal copper extracted from its pyrite ore? How is it refined? 4
9. A coinage metal (M) of electronic configuration $[\text{Ar}] 3d^{10} 4s^1$ belongs to group IB in the periodic table.
(A) Draw a blast furnace for the smelting process during the extraction of M using its chief ore.
(B) Explain the different reactions involved during the formation of matte in the furnace. 3+2
10. A flesh-pink metal with valence shell electronic configuration $4s^1 3d^{10}$ belongs to group (IB) in the periodic table. The metal is commonly used to make electric cables and electrical appliances.
 - a. What is the chief ore of (M)? Write its molecular formula. 1
 - b. Draw a well-labelled diagram of smelting for the extraction of M. Write down the necessary chemical equations that occur during the smelting process. 3
 - c. Write the reaction of the metal with moist air. 1

Properties of Copper

1. Action of Air

11. Give reason: Metallic copper turns black when exposed to moist air. 1
12. Give reason: Copper becomes green when exposed to air for a long time. 1
Give a chemical reaction for the following:
Copper is exposed to moist air. 1
How does copper metal react with moist air? 1
13. How is black oxide converted into red oxide? 1

2. Action with acid:

14. What happens when
 - a. copper turnings are treated with conc. HNO_3 ? 1
 - b. A copper coin is dipped into concentrated nitric acid in a test tube. 1
 - c. A brown gas is obtained when copper is treated with conc. Nitric acid. 1
15. How does copper metal react with conc. H_2SO_4 ? 1

16. How does copper metal react with conc. HNO_3 ? 1

3. Action with Metal Ions (Copper as reductant)

17. When copper wire is put into a solution of silver nitrate, beautiful crystals are deposited on the surface of the copper. What are these crystals chemically? Write the reaction involved. 2

Uses of Cu

Some alloys of copper:

18. Name any one alloy of copper. 0.5

19. Name an alloy of each of: 0.5 x 2

- a. Copper and Zinc b. Copper and tin

Blue vitriol ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$)

Preparation

20. Give a balanced chemical equation for the preparation of copper sulphate from copper. 1

21. Starting from copper, how would you obtain blue vitriol? 1

22. Give a chemical reaction for the following:
Conversion of copper into blue vitriol. 2

23. Write a method of preparation of blue vitriol. 1

Properties

➤ Action of heat:

24. What is the effect of heat on copper sulphate pentahydrate? 2

Write the action of heat on blue vitriol. 2

What happens when blue vitriol is heated at 100°C ? 1

25. Give reason: Copper sulphate turns white powder on heating. 1

➤ Action with Ammonia:

26. What happens when copper sulphate solution is treated with ammonia solution? 2

Ammonium hydroxide is added to a solution of copper sulphate. 1

Describe the action of blue vitriol with ammonia solution till excess. 2

➤ Action with potassium iodide:

27. Describe the action of blue vitriol with aqueous potassium iodide. 2

➤ Action with potassium ferrocyanide solution:

28. Give any one method of conversion of cupric sulphate into cuprous oxide with chemical equations. 2

29. A light blue colored precipitate 'A' obtained by the addition of caustic soda to the solution of cupric sulphate is converted to a black precipitate 'B' on heating. What are 'A' and 'B'? 2

Uses

30. Write an important use of blue vitriol. 0.5

31. Write down the chemistry of blue vitriol. 5

Write a short note on the chemistry of blue vitriol. 5

Mention the preparation, properties, and uses of blue vitriol. 5

32. Pentahydrate copper sulphate is called blue vitriol.

- i) Starting from metallic copper, how can you obtain blue vitriol?
- ii) What happens when an aq. solution of blue vitriol is treated with excess ammonia solution?
- iii) Give a reaction for the conversion of blue vitriol into black oxide.
- iv) Why is hydrated copper sulphate called blue vitriol?

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Black oxide of copper (CuO, cupric oxide) & Red oxide of copper (Cu₂O, cuprous oxide)

- 33. Write an important use of red oxide. 0.5
- 34. Copper (II) sulphate crystals are commonly known as blue vitriol.
 - i) How would you obtain a saturated CuSO₄ solution? 1
 - ii) Convert blue vitriol to red oxide. 2
 - iii) Write any two applications of blue vitriol. 2

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