

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86  
(For candidates admitted during the academic year 2008 –09)

SUBJECT CODE: CH/MC/IC13  
B.Sc. DEGREE EXAMINATION, NOVEMBER 2008  
BRANCH IV- CHEMISTRY  
FIRST SEMESTER

REG.NO .....

COURSE : MAJOR CORE

PAPER : INORGANIC CHEMISTRY-I

TIME : 30 MINUTES

MAX.MARKS : 30

SECTION – A

(30x1=30)

ANSWER ON THE QUESTION PAPER ITSELF.

Answer all the questions.

I Choose the correct answer:

- The binding energy per million electron volt of  ${}_{20}\text{Ca}^{40}$  is  
a) 8.55                      b) 6.56                      c) 10.3                      d) 16.0
- Galena is the ore of  
a) Fe                      b) Pb                      c) Cu                      d) Ti
- Mond's process is used to refine  
a) Pt                      b) Au                      c) Ag                      d) Ni
- Froth floatation technique is used for  
a) Carbonate ore      b) Sulphide ore      c) Oxide ore      d) Hydroxide ore
- The antiparticle theory of nucleon was put forth by  
a) Huckel                      b) Mulliken                      c) Pauling                      d) Dirac.
- Refining Ni by decomposing its carbonyl is called  
a) Mond's Process                      b) Van Arkel Process  
c) Aluminothermit process                      d) auto reduction process
- Heating the ore in the presence of air is called  
a) calcinations                      b) smelting                      c) roasting                      d) refining
- In the redox reaction between  $\text{Fe}^{2+}$  and  $\text{Sn}^{4+}$ .  $\text{Fe}$  loses \_\_\_\_\_ electron and  $\text{Sn}$  gains \_\_\_\_\_ electron.  
a) 1 and 2                      b) 2 and 3                      c) 2 and 1                      d) 3 and 2
- The particle with maximum mass is  
a)  $\alpha$                       b)  $\beta$                       c)  $\gamma$                       d) meson
- Pick the odd one out.  
a)  $4n$                       b)  $4n+1$                       c)  $4n-1$                       d)  $4n+2$

**I1 State whether true or false:**

11. Potassium permanganate is a reducing agent.
12. Germanium may be purified by zone refining technique.
13. Nuclear transmutations are by nuclear reactions.
14. When  $\theta$  value of a nuclear reaction is positive the reaction is said to be endoergic.
15.  ${}_7N^{14} + {}_2He^4 \rightarrow {}_8O^{17} + {}_0n^1$

**III Fill up the blanks:**

16. The ore of mercury is \_\_\_\_\_.
17. One a.m.u is \_\_\_\_\_ kg.
18.  ${}_{92}U^{235} + {}_0n^1 \rightarrow \text{_____} + \text{_____} + \text{_____}$ .
19. The radioisotope used in the treatment of cancer is \_\_\_\_\_.
20. The metal isolated by auto reduction process is \_\_\_\_\_.

**IV Match the following:**

- |                         |   |                 |
|-------------------------|---|-----------------|
| 21. $KMnO_4$            | - | reducing agent  |
| 22. $I^-$               | - | refining        |
| 23. magnetic separation | - | oxidising agent |
| 24. Smelting            | - | ore dressing    |
| 25. Van Arkel's process | - | isolation       |

**V Answer in one or two sentences:**

26. Define oxidizing agent. Give one example.
  
27. What is the principle of redox titrations?
  
28. Why  ${}_{92}U^{238}$  not suitable for nuclear fission reaction.
  
29. Mention any four ore dressing procedures.
  
30. A typical neutron initiated fission of  ${}_{92}U^{235}$  yields  ${}_{42}Mo^{97}$ , two neutrons and an isotope of what element?  

$$({}_{92}U^{235} + {}_0n^1 \rightarrow {}_{42}Mo^{97} + 2{}_0n^1 + {}_zX^n)$$



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**TIME : 2½ HOURS**

**MAX.MARKS : 70**

**SECTION – B**

**(5x6=30)**

**Answer any five questions:**

1. Differentiate between (i) mineral and ore  
(ii) calcinations and roasting  
(iii) gangue and flux
2. Write short notes on (i) Electro refining  
(ii) Zone refining  
(iii) Van Arkel method
3. What will be the Emf of a Daniel cell having 0.01m  $\text{CuCO}_4$  and 0.2m  $\text{ZnSI}_4$ .
4. Complete and balance the following chemical redox reactions.  
(i)  $\text{MnO}_4 + \text{H}^+ + \text{C}_2\text{O}_4^{2-} \rightarrow$   
(ii)  $\text{Fe}^{3+} + \text{Sn}^{2+} \rightarrow$
5. Calculate the binding energy per nucleon of oxygen atom  ${}_8\text{O}^{16}$  which has a mass of 15.9948 a.m.u. The mass of neutron is 1.008665 a.m.u., mass of proton 1.007277 a.m.u. & mass of electron 0.0005486.
6. How radiations are detected and measured?
7. a) Explain Goldschmidt Thermit process  
b) Define the following  
(i) isotopes (ii) isobars (iii) isotones

**SECTION – C**

**(2x20=40)**

**Answer any two questions:**

8. a) What are nuclear reactions? How do they differ from chemical reactions?  
Distinguish between natural radioactivity and artificial radioactivity.  
b) Discuss the detail the synthesis of artificial isotopes.

9.
  - a) Explain Yukawa's theory of nuclear forces.
  - b) What is Soddy's group displacement law? Explain.
  - c) Give a note on radioactive series.
  - d) Discuss in detail the nuclear shell model of the nuclear structure.
10.
  - a) What is meant by the term metallurgy? Discuss the various steps involved in getting pure metal from its sulphide ore.
  - b) Explain how n/p ratio decides the stability of a nucleus?
11. Write a note on the following:
  - a) Nuclear fusion and fission reactions.
  - b) Disposal of nuclear waste.
  - c) Applications of isotopes in
    - i) medicine
    - ii) reaction mechanism

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