



# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

## B.Sc. DEGREE EXAMINATION – CHEMISTRY

FIFTH SEMESTER – APRIL 2019

### CH 5511– TRANS ELEM. & NUCLEAR CHEMISTRY

Date: 15-04-2019  
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

#### PART-A

Answer ALL questions

(10x2=20)

1.  $\text{CuCl}_2$  is coloured while  $\text{CuCl}$  is colourless. Why?
2. Mention the toxicity of mercury.
3. Write any two ores of vanadium.
4. What do you mean by mineral beneficiation?
5. Write the most common oxidation state of lanthanides and actinides.
6. Mention the name of radioactive lanthanide element and give its electronic configuration.
7. Define the term 'half life period'.
8. State the odd-even rule.
9. Write any two differences between nuclear fusion and nuclear fission.
10. How many  $\alpha$  and  $\beta$  particles will be ejected in the conversion of  ${}_{92}\text{U}^{235}$  to  ${}_{82}\text{Pb}^{207}$ ?

#### PART-B

Answer any EIGHT questions

(8x5=40)

11. Write a note on the toxicity of Cd.
12. What are interstitial nitrides? How are the interstitial nitrides of Titanium prepared?
13. Explain how chromium is extracted from its ore?
14. Draw Ellingham diagram and explain its uses.
15. Explain the uses of electrostatic precipitation in metallurgical process.
16. What is lanthanide contraction? Explain its causes and consequences.
17. Enumerate the differences between lanthanides and actinides.
18. Write the principle and working function of Geiger – Muller counter.
19. What is binding energy?

Calculate the nuclear binding energy per nucleon (in J) of the following isotopes.

- a)  ${}^7_3\text{Li}$  (7.0160 amu)      b)  ${}^{35}_{17}\text{Cl}$  (34.95952 amu)

20. Explain the principle and applications of neutron activation analysis.

21. What are nuclear reactions? How do they differ from chemical reactions?

22. Define the following terms.

- a) Spallation reaction      b) Nuclear chain reaction

### PART-C

**Answer any FOUR questions**

**(4x10=40)**

23. a) Explain the industrial applications of interstitial compounds of Ti and W. (6)

b) Write any four differences between the first and other row transition elements (4)

24. a) Explain the various factors influencing the choice of extraction processes. (5)

b) Explain how Titanium is extracted from its ore? (5)

25. Discuss the colour and spectra of lanthanides.

26. Explain the following

- a) Group displacement law    b) Geiger-Nuttal rule

27. a) Explain the principle and the applications of atomic nuclear reactors (5)

b) Write a note on the nuclear reactors in India.(5)

28. Explain the various factors affecting the stability of a nucleus.

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