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B.Sc part III Inorganic Chemistry Topic: Nuclear chemistry semester :vi

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A) Select the most correct alternative from among those given below

- 1) When heavy water is used as moderator then it is called
a) Reactor b) coolant c) heavy water reactor d) light water reactor
- 2) In nuclear reactor graphite is used as
a) catalyst b) fuel c) coolant d) moderator
- 3)reaction is source of atomic energy for peaceful purpose .
a) uncontrolled fission b) chemicals c) projectile capture d) controlled fission
- 4) the isotopes emitting radioactivity is called asisotopes
a) radio b) parent c) daughter d) none of these
- 5) cooling liquid are
a) ion exchanger b) heat exchanger c) heat transfer agent d) neutral
- 6) which of the following is not coolant
a) heavy water b) light water c) liquid sodium d) Uranium
- 7) In nuclear reactor ,moderator are used to neutron.
a) increase kinetic energy of b) slow down fission
c) enhance the d) increase the K.E.of fission
- 8) Which of the following is act as control rod in nuclear reactor.
a) Np b) Cd c) Th d) U

B) Write a short notes on:

- a) Nuclear reaction.
- b) Types of nuclear reaction.
- c) Artificial radioactivity.
- d) Artificial transmutation.
- e) Nuclear fission reaction .
- f) Nuclear fusion reaction.
- g) Heavy water nuclear reactor.
- h) Radio isotopes as tracer in structure determination of PCl_5 .
- i) Energetics of nuclear reaction.
- j) Radioisotopes as tracer in chemical investigation (esterification)
- k) Isotopic dilution method for determination of volume of blood.

C) Long answer type question.

- a) What are nuclear reactions? Give types of nuclear reactions.
- b) What is artificial transmutation? How is it effected?
- c) What is artificial radioactivity?illustrate it with the help of suitable example.
- d) Discuss application of radioisotopes as tracer s.
- e) Explain in brief artificial atomic transmutation.
- f) What are nuclear reaction ?explain energetics in nuclear reaction .describe artificial radioactivity.
- g) Give points of distinctions between nuclear fission and nuclear fusions
- h) How will you decide the total volume of blood in a patient.
- i) What are endorgic and exorgic nuclear reaction.

Thermodynamics and kinetic aspects of metal complexes

A) Select the most correct alternative from among those given below.

- 1) Kinetic stability depends onenergy.
a) reaction b) product c) potential d) activation
- 2) according to VBT, outer orbital complexes are
a) inert b) labile c) moderate d) instable
- 3) instability constant is theof stability constant
a) reciprocal b) product c) deviation d) addition
- 4) higher the basicity of ligandsstable will be the complex .
a) more b) less c) un d) moderately
- 5) generallymembered ring are most stable
a) three b) four c) five d) six
- 6) More polar ligands generally form complex.
a) Unstable b) stable c) less stable d) moderate
- 7) values of CFSE more stable will be complex
A) higher b) smaller c) lesser d) constant
- 8) complexes which do not undergo substitution or undergo substitution very slowly are known as.....
a) stable b) unstable c) inert d) labile

long answer type question

1. What are stepwise stability constant? How are they related to overall stability constant.
2. Discuss kinetic stability in brief.
3. Discuss thermodynamic stability in details.
4. Explain the relation between thermodynamic stability and kinetic stability.

Explain the following terms

1. Thermodynamic stability
2. Kinetic stability
3. Stepwise stability constant
4. Overall stability constant
5. Effect of nature of ligands on stability of complexes.
6. Effect of steric factor on stability of complexes

Bio-inorganic chemistry

A) Select the most correct alternative from among those given below.

- 1) is essential structural element for all organism
a) Na b) Ca c) Au d) Ag
- 2) The important role in maintaining correct heart beats is of
a) Ca b) Cd c) As d) Pd
- 3) The element which are absolutely necessary for life process are..... element
a) trace b) essential c) either trace or essential d) neither trace or essential
- 4) The role of Na^+ and K^+ in metabolism is
a) CO_2 transport b) pH of fluids c) to maintain osmotic pressure of fluids d) all of these
- 5) Function of myoglobin is to
a) transport O_2 b) store O_2 c) transport CO_2 d) store O_2
- 6) There are..... haeme group in haemoglobin.
a) 1 b) 2 c) 3 d) 4
- 7)..... metal is involved in blood clotting .
a) Ca b) Fe c) Cd d) Pb

B) Long answer type questions

- 1 Discuss the trace and essential elements in biochemical process.
- 2 What are metalloporphyrins.
- 3 Discuss the Biological role of alkali and alkaline metal ions.
- 4 Discuss the Biological role of essential elements.
- 5 Give the structure of myoglobin and haemoglobin.
- 6 What are trace elements in biochemical process.
- 7 Draw the structure of porphyrin molecule.
- 9) Explain the important functions of Na^+ , K^+ , Ca^+ .
- 10) Explain the biological role of any one of essential element.

Iron and steel

A) Select the most correct alternative from among those given below.

- 1) Chemical composition of haematite (red) is
 - a) Fe_2O_3
 - b) Fe_3O_4
 - c) FeS_2
 - d) FeCO_3
- 2) Purest form of iron is..... iron
 - a) wrought iron
 - b) steel
 - c) cast
 - d) pig
- 3) Slag is the mixture of
 - a) Al silicates and Ba Silicates
 - b) Al silicates and Ca Silicates
 - c) Al silicates and Mg Silicates
 - d) Al silicates and Sr Silicates
- 4) Varieties of iron are.....
 - a) Caste iron and steel iorn
 - b) Wrought iorn ,steel and caste
 - c) Caste iron,pig and steel iorn
 - d) Cast ,wrought ,steel, pig.
- 5) The process of heating steel to bright redness and cooling suddenly by plunging in oil or water is known as....
 - a) Annealing
 - b) Hardening
 - c) Case hardening
 - d) Tempring
- 6) $\text{CO}_2 + \text{C} = 2 \text{CO}$. This reaction is
 - a) Exothermic
 - b) Endothermic
 - c) Party exothermic and partly endothermic
 - d) All of above

LONG ANSWER TYPE QUESTION

- 1 Discuss occurrence of iron.
- 2 Explain heat treatment on steel.
- 3 How does iron occur in nature.
- 4 Define steel .Discuss types of steel.
- 5 What are products of blast furnace .
- 6 What is steel ? Explain In brief carbon steel.
- 7 Discuss the extraction of cast iron from suitable ore.
- 8 Discuss the conversion of cast iron into steel by Bessemer or L.D. process.
- 9 Distinguish between Bessemer process and L.D. process.
- 10 Give balance chemical equation involved in different zone of blast furnace .
- 11 Give balance chemical equation involved in Bessemer furnace.

Study of actinides

A) Select the most correct alternative from among those given below.

- 1) Transuranic elements are also called as element .
a) Manmade b) lanthanides c) lanthanons d) p block
- 2) Actinons have incomplete outermost shells.
a) Two b) three c) four d) five
- 3) Actinides are placed in.....period in periodic table.
a) 4th b) 5th c) 6th d) 7th
- 4) Name for the element having atomic number 111
a) un-un-unium b) un-un-bium
c) un-un-nilium c)un-nil-unium
- 5) The element after Uranium are called..... element.
a) Transuranic b) transition c) inner transition d) 'p' block
- 6) The element having name Un-un-pentium.
a) 114 b) 115 c) 116 d) 117

B) Define transuranic element

C) What is the position of actinides in periodic table

D) What is outer general electronic configuration of actinides series .

E) Why are the actinides element radioactive.

F) Which actinides element occure naturally on Earth?