DEPARTMENT OF CHEMISTRY

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

B.TECH (2018-2019)

Subject/Code: Chemistry/ 18CYB101J **Semester-I**

MODULE III

1. Which of the following is also known as X-ray photoelectron spectroscopy?

   a) Auger electron spectroscopy

   b) Electron impact spectroscopy

   c) **Electron spectroscopy for chemical analysis**

   d) Secondary ion mass spectroscopy

2. Which of the following methods use soft X-rays to eject electrons from inner shell orbitals?

   a) Auger electron spectroscopy

   b) Electron impact spectroscopy

   c) X-ray crystallography

   d) **X-ray photoelectron spectroscopy**

3. The energy required to remove an electron from the highest occupied atomic orbital is known as _____

   a) **Ionization energy** b) Kinetic energy c) Binding energy d) Vibrational energy

4. X-ray diffractometers are not used to identify the physical properties of which of the following?

   a) Metals **b) Liquids** c) Polymeric materials d) Solids

5. Minimum interplanar spacing required for Bragg's diffraction is _____

   a) $\lambda/4$ **b) $\lambda/2$** c) 4λ d) 2λ

6. Which of the following is amorphous solid?

a) Table salt b) Diamond **c) Plastic** d) Graphite

7. Na^+Cl^-, Cs^+Cl^- are the examples of

a) cubic crystal system b) tetragonal crystal system c) orthorhombic crystal system d) rhombohedral crystal system

8. The Bragg's equation for diffraction of X-rays is _____

a) $n\lambda = 2d^2\sin\theta$ **b) $n\lambda = 2d\sin\theta$** c) $n\lambda = 2d\sin^2\theta$ d) $n\lambda = d^2\sin\theta$

9. Obtain a Miller indices of a plane whose intercepts are 4,4 and 2 units along the three axes.

a) (122) b) (211) c) (121) **d) (112)**

10. The most electronegative element possess the electronic configuration is

a) $ns^2 np^2$ b) $ns^2 np^4$ **c) $ns^2 np^5$** d) $ns^2 np^3$

11. The size of Mo is very similar to W due to_____

a) Shielding effect

b) Actinide contraction

c) Poor Shielding by 4f electrons

d) Poor shielding by 4d electrons

12. Choose the correct order ionization energy

a) N > O > F

b) F > O > N

c) N > O < F

d) O > F > N

13. The first, 2nd and 3rd ionization enthalpies of gallium are 579KJmol^{-1}, 1979 KJmol^{-1} and 2962 KJmol^{-1} even though the 3rd I.P is highest, Ga^{3+} is the most stable because-----

a) The energy loss is maximum resulting greater stability

b) The size of Ga3+ is smallest

c) Ga3+is most reactive

d) It attains a stable configuration

14. Choose the incorrect order with respect to the properties indicated

a) Electro negativity F >Cl> Br

b) Electron affinity Cl> F > Br

c) Oxidizing power F_2> Cl_2> Br_2

d) Bond enthalpy F_2> Cl_2> Br_2

15. Choose the correct statement

a) As shielding effect increases electro negativity decreases

b) As shielding effect increases electro negativity increases

c) As ionization potential increases metallic property increases

d) As +ve charge on species increases ionic radii increases

16. Choose the correct statement with respect to oxidising property of F

a) It is the strongest oxidising agent because it has highest electron gain enthalpy

b) It is the strongest oxidising agent due to its small size

c) It is the strongest oxidising agent because it has maximum electron negativity

d) It is the strongest oxidising agent due to high lattice enthalpy.

17. In a period with increase in atomic number, the metallic character of an element

a) Decrease across period increases in group

b) increase across period& decreases in group

c) increase across period& increases in group

d) Decrease across period& decreases in group

18. The co-ordination number and oxidation number of X in $[X(SO_4)(NH_3)_4]Cl$ is

(a) 10 and 3

(b) 2 and 6

(c) 6 and 3

(d) 6 and 4

19. Which of the following species has the highest ionization potential?

a) **Li^+**

b) Mg^+

c) Al^+

d) Ne

20. What is the coordination number and oxidation state for the cobalt atom in the compound $[Co(NH_3)_5Cl]Cl_2$?

a. 4 ; +2

b. 5 ; +2

c. 6 ; +2

d. **6 ; +3**

21. Repeatable entity of a crystal structure is known as ------

a. Crystal (b) Lattice **(c) Unit cell** (d) Miller indices

22. The source for XPS is -----

a) Mercury - arc

b) Nernst glower

c) Globar source

d) **AlK_α**

23. Compute the miller indices for the intercepts X 1/4, Y=1 and Z=1/2

a) **(412)**

b) (632)

c) (101)

d) (110)

24. The correction factor for modified Van der Waals equation of state is

a) a/b **b)a/V^2** c) a/V d)V-nb

25. Calculate Z_{eff} for 4s electron in potassium atom (Z for Potassium=19)

a) 2.2 b. 6.8 c) 10 d) 16.8

26. In the X-ray diffraction pattern for a bcc lattice h,k,l can have

a) any value b) even value **c) h+k+l even** d) odd values

27. The smallest interplanar spacing in a crystal which will give nth order Bragg reflection is

a) $d_{hkl} = h$ **b) $d_{hkl} = n/2$** c) $d_{hkl} = n/3$ d) $d_{hkl} = n/4$

28. The second ionisation energy is always higher than the first ionization energy because the

a) electron is attracted more by the core electrons

b) **electron is more tightly bound to the nucleus in an ion**

c) becomes more stable attaining the octet or duplet configuration

d) atomic radii is large

29. First law of thermodynamics states that

a) $\Delta U = q-w$ **b) $\Delta U = q+w$** c) $\Delta U = q+ \Delta w$ d) $\Delta E = \Delta q + w$