

THAPAR UNIVERSITY

ARANYA 2009

"CHEM-IZZA"

ROUND-1



INSTRUCTIONS:

Starting Time: 21st October 2009, 6PM

Ending Time: 23rd October 2009, 6PM

Maximum Marks: 45

For MCQ's

Correct answer: 2 marks

Incorrect answer: -1 mark

For subjective question's

Correct answer: 3 marks

Incorrect answer: 0 marks

- 1. Individual Participation only.**
- 2. The Quiz is open to both school, college students and Professionals.**
- 3. Only the ANSWERS to be mailed and not the complete solutions.**
- 4. Contestants will have 48 hours to send in their entries for each round.**
- 5. All entries must be sent to the email address "onlinequiz09@gmail.com", with the subject line 'ONLINE QUIZ ANSWERS', mentioning the Name, Institute/Organization names, Contact number and Address.**
- 6. Those who qualify in 1st round will be eligible to take part in the final round.**
- 7. The decision of the Event Co-ordinators will be final.**

Q1. Which one of the following sets of quantum numbers (n,l,m,s) represents as impossible arrangement?

- a. 3, 2, -2, $\frac{1}{2}$
- b. 4, 0, 0, $\frac{1}{2}$
- c. 3, 2, -3, $\frac{1}{2}$
- d. 5, 3, 0, $\frac{1}{2}$.

Q2. Rate of diffusion of a gas is:

- a. directly proportional to its density
- b. directly proportional to its molecular weight
- c. directly proportional to the square root of its molecular weight
- d. Indirectly proportional to the square root of its molecular weight.

Q3. A solution containing one mole for liter each of $\text{Cu}(\text{NO}_3)_2$, AgNO_3 , $\text{Hg}_2(\text{NO}_3)_2$ and $\text{Mg}(\text{NO}_3)_2$ is electrolyzed using inert electrodes.

Standard electrode potentials in volts (reduction potentials) are:

$$\text{Ag}^+ | \text{Ag} = 0.80$$

$$\text{Hg}^{2+} | \text{Hg} = 0.79$$

$$\text{Cu}^{2+} | \text{Cu} = 0.34$$

$$\text{Mg}^{2+} | \text{Mg} = -2.37$$

With increasing voltage, the sequence of deposition of metals on the cathode will be:

- a. Ag, Hg, Cu, Mg
- b. Mg, Cu, Hg, Ag
- c. Ag, Hg, Cu
- d. Cu, Hg, Ag.

Q4. A beaker contains a small amount of gold dust (Au(s)). Which of the following aqueous solutions, when added to the beaker, would dissolve the gold dust (i.e., convert Au(s) to Au^{3+} (aq))?

- a. $\text{Cr}_2\text{O}_7^{2-}$ (acidic solution)
- b. H_2O_2 (acidic solution)
- c. Br_2
- d. Zn^{2+}
- e. Al^{3+} .

Q5. A mixture of compound A and B a higher boiling azeotrope at $x=0.75$ at 1 atm total pressure. Then a solution of this composition has a bubble point T_b and a vapor of same composition has a dew point T_d . Then:

- a. $T_b > T_d$
- b. $T_b = T_d$
- c. $T_b < T_d$.
- d. Insufficient data

Q6. The gas A diffuses through non-diffusing B from point 1 to point 2. Given: $P=2\text{atm}$; $y_{A1}=0.1$; $y_{A2}=0$. Then ratio $(dp_A/dz)_1 / (dp_A/dz)_2$ is:

- a. 10
- b. 1.11
- c. 11.11
- d. 0.9.

Q7. In a homogeneous catalytic reaction 1.9 M of substrate and 1.0 μM of a catalyst yields 1.0 mM of a product in 10 seconds. The turnover frequency (TOF) of the reaction (s^{-1}) is:

- a. 10^{-2}
- b. 10^2
- c. 10^3
- d. 10^{-3} .

Q8. In waterline corrosion, the maximum amount of corrosion takes place:

- a. along a line just above the level of the water meniscus
- b. along a line at the level of the water meniscus
- c. along a line just below the level of the water meniscus
- d. at the bottom of the vessel.

Q9. A plane with intercepts 0.5a, 0.25a and 1.5a has the miller indices:

- a. 1 3 6
- b. 3 6 1
- c. 6 3 1
- d. 1 6 3.

Q10. In natural radioactive disintegration, Uranium-238 emits one alpha and two beta and then five alpha particles successively. The end product obtained is:

- a. ${}^{210}_{82}\text{Pb}$
- b. ${}^{212}_{82}\text{Pb}$
- c. ${}^{214}_{82}\text{Pb}$
- d. ${}^{200}_{82}\text{Pb}$.

Q11. Which one of the following techniques is used to detect the steroid consumed by the athletes in international sports competitions.

- a. IR Spectroscopy
- b. Gas Chromatography
- c. pH Measurements
- d. UV Spectroscopy

Q12. A carcinogen which causes cancer of liver is

- a. Toluene
- b. Benzene
- c. Vinyl Chloride
- d. All of these

Q13. Half life period of a radioactive element is 140 days. After 560 days, 1 gm of the element will reduce to...

- a. $\frac{1}{2}$ g
- b. $\frac{1}{4}$ g
- c. $\frac{1}{8}$ g
- d. $\frac{1}{16}$ g

Q14. For ideal diatomic gases,

- a. $C_p = \frac{7}{2}R$
- b. $C_p = \frac{3}{2}R$
- c. $C_v = \frac{7}{2}R$
- d. $C_v = \frac{3}{2}R$

Q15. Oiliness is least in case of :

- a. Greases
- b. Mineral oils
- c. Animal oils
- d. Palm oil

Q16. An athlete is given 100g glucose($C_6H_{12}O_6$) of energy equivalent to 1560 KJ. He utilizes 50% of this gained energy in the event. In order to avoid storage of energy in the body, calculate the weight of water he would need to perspire. The enthalpy of evaporation of water is 44 KJ/mol.

Q17. What is the e.m.f. of the following cell at 25°C?



The standard e.m.f. of the cell is 1.54 V.

Q18. Calculate the reduced mass of CN molecule? Given atomic weights of C=12.011 and N=14.0067amu.

Q19. A first order reaction has a 'k' value of $4.5 \times 10^3 s^{-1}$ at 1°C and activation energy of 58 kJ mol⁻¹. At what temperature would k be $1.00 \times 10^4 s^{-1}$?

Q20. The mean molar heat capacities, at constant pressure, of hydrogen, oxygen and water vapor in the temperature range from 25°C to 100°C are as follows:

$$H_2 (g) = 6.92; O_2 (g) = 7.04; H_2O (g) = 8.03 \text{ cal deg}^{-1} \text{ mol}^{-1}.$$

The heat of reaction at 25°C is -57.8 kcal mol⁻¹. Calculate the standard heat of formation of water vapor at 100°C.