



Shree H. N. Shukla College of Science Rajkot
B.Sc. (Sem- 1) (CBCS)
Biochemistry Physical and Chemical Aspects of
BC-101: Question Bank

Unit-1

1. What is a lone pair of electrons. Draw an electron dot diagram of a hydronium ion (with lone pair).
2. State each as oxidation or reduction
3. Name the charged particles which attract one another to form electrovalent compounds.
4. How are electrons involved in the formation of a covalent compound?
5. In the formation of magnesium chloride (by direct combination between magnesium and chlorine), name the substance that is oxidized and the substance that is reduced.
6. The one which is composed of all the three kinds of bond (ionic; covalent and coordinate bond) is:
7. Draw the structural formula of carbon tetrachloride and state the type of bond present in it
8. Select the correct answer from A, B, C and D – Metals lose electrons during ionization – this change can be called:
9. Define covalent bond / ionic bond / covalent & coordinate bond.
10. In covalent compounds, the bond is formed due to (sharing/transfer) of electrons.
11. Draw an electron dot diagram, showing the lone pair effect for formation of NH_4^+ ion from NH_3 gas and H^+
12. Hydrogen chloride can be termed as a polar covalent compound.
13. Draw an electron dot diagram to show the structure of hydronium ion. State the type of bonding present in it.
14. A chemical term for. A bond formed by a shared pair of electrons with both electrons coming from the same atom.
15. Ammonium chloride has all the three electronic bonds
16. Give a reason why covalent compounds exist as gases, liquids or soft solids?
17. Give scientific reasons: Carbon tetrachloride does not conduct electricity.
18. Explain the bonding in methane molecule using electron dot structure.

Unit-2

1. System and Surroundings,
2. Types of system (open, closed, isolated),
3. State variables/functions,
4. Thermodynamic processes (isothermal, adiabatic, isobaric, isochoric),
5. Sign conventions,
6. Extensive and Intensive properties,
7. Enthalpy and Entropy,
8. Gibbs free energy,
9. First law of thermodynamics,
10. Relationship between C_p and C_v ,
11. Standard enthalpy of reactions,
12. Enthalpy changes during phase transformations,
13. Properties of enthalpy changes,
14. Hess's law of constant heat summation and
15. Calorimetry



Unit-3

- 1) Suppose you had a buffer containing 0.5 moles of sodium dihydrogen phosphate and 0.5 moles of sodium hydrogen phosphate. How many moles of hydrochloric acid would this phosphate buffer be able to a...
- 2) Explain what is buffering capacity.
- 3) 100 mL of 0.20 M acetic acid and 100 mL of 0.20 M sodium acetate are mixed. If 0.0050 moles of solid NaOH is added to this solution, what is the pH?
- 4) If 100 mL of 0.20 M acetic acid and 100 mL of 0.20 M sodium acetate are mixed, what is the pH of the resulting solution? The pKa of ethanoic (acetic) acid is 4.76 at 25 degrees Celsius.
- 5) Calculate the pH of a solution made by mixing 250 mL of 0.200 M methanoic acid with 100 mL of 0.20 M sodium hydroxide.
- 6) A strong base is dissolved in 705 mL of 0.600 M weak acid ($K_a = 4.31 \times 10^{-5}$) to make a buffer with a pH of 3.92. Assume that the volume remains constant when the base is added. $HA(aq) + OH^-(aq) \rightleftharpoons A^-(aq) + H_2O(l)$
- 7) Calculate the pH of a 1.2 L aqueous solution made from 0.40 mol CH_3COOH and 0.80 mol KCH_3COO ($K_a = 1.8 \times 10^{-5}$).
- 8) Is the purpose of a buffer to maintain a pH of 7? Explain.
- 9) How do buffers work, in terms of pH? In terms of human body, are they varying levels of pH?
- 10) 100 mL of lithium hydrogen carbonate solution is mixed with 100 mL of sodium dihydrogen phosphate solution. Predict the position of equilibrium in this reaction. a. equilibrium greater than 50% b....
- 11) The pH of a 1-L phosphate buffer solution was measured as 7.6, but the experimental procedure calls for a buffer with a pH of 7.2. Why would altering the ratio of monosodium/disodium phosphate adde...
- 12) Which of the following solutions is most resistant to a change in pH when a small amount of an acid or a
- 13) What quantity of NaOH should be dissolved in 15000 ml of water to obtain 4% concentration?
- 14) Given the following information: $HF(g) \rightleftharpoons H^+(aq) + F^-(aq); K_c = 6.8 \times 10^{-4}$ (at 25 degrees Celsius) $H_2C_2O_4(aq) \rightleftharpoons 2H^+(aq) + C_2O_4^{2-}(aq); K_c = 3.8 \times 10^{-6}$ (at 25 degrees Celsius) Determine the va...

- 15) List the solutions from highest pH to lowest pH. a. 1.0 mol/L HNO₃(aq) b. 1.0 mol/L K₂SO₃(aq) c. 1.0 mol/L HF(aq) d. 1.0 mol/L LiOH(aq)
- 16) List the bases from highest pH to lowest pH. a. 1.0 mol/L LiNO₂(aq) b. 1.0 mol/L KOCl(aq) c. 1.0 mol/L NaF(aq) d. 1.0 mol/L KOH(aq)
- 17) Hydrazine, N₂H₄(aq), is used in the preparation of polymers, pharmaceuticals, and rocket fuel. It has alkaline properties similar to ammonia and will act as a weak base. Given that a 100-mL sample...
- 18) What is the pH of 0.025 M (CH₃)₃N(aq)? For (CH₃)₃N, K_b = 6.5 x 10⁻⁵. A. 12.40 B. 9.81 C. 11.11 D. 8.29 E. 11.91
- 19) A buffer solution contains 0.200 M acetic acid and 0.200 M sodium acetate. What is the pH after 0.02 moles of HCl is added to 1.0 L of this buffer? (pK_a = 4.75 for acetic acid)
- 20) Quinine, an important drug in treating malaria, is a weak Bronsted base whose pK_b is 5.480. Calculate the pH and pOH for a 0.150 M solution of Quinine.

Unit-4

- 1) Define Osmosis
- 2) Role of osmosis
- 3) What is osmosis and example?
- 4) Function of osmosis.
- 5) Define viscosity
- 6) What is the unit of viscosity?
- 7) Factors affecting viscosity.
- 8) Define Diffusion
- 9) What is the role of diffusion plant?
- 10) What are the factors affecting diffusion.
- 11) Define Adsorption
- 12) What is the role of osmosis?
- 13) Factors affecting Adsorption.
- 14) What Is Reverse Osmosis?
- 15) How many type of adsorbent are used?
- 16) What is solvent?
- 17) Define Concentration Gradient.