

St. Joseph's College of Arts & Science (Autonomous)
Cuddalore – 607001

QUESTION BANK

CLASS:I - B.Sc., CHEMISTRY (SHIFT I&II)

SEMESTER:II

SUBJECT: ANALYTICAL CHEMISTRY-I

SUB.CODE: CH204T

NAMES OF THE STAFF: F. PAUL AROCKIADOSS &B.KANIMOZHI

.....

UNIT –I

SECTION –A

1 MARK

I.CHOOSE THE CORRECT ANSWER:

1. The formulae for calculating confidence limit is -----.
a) standard deviation x 100/mean b) standard deviation x mean c) mean x 100/standard deviation d) none of the above
2. The random error observation is -----.
a) Indeterminate error b) Determinate error c) Cooperative error
d) Absolute error
3. Identify the error when dropping the sample bottle on the floor.
a) Methodic error b) accidental error c) gross error d) instrumental error
4. Smaller is the average deviation, the precision value will be
a) Smaller b) greater c) larger d) wider
5. Number of significant figures in 6.023×10^{23}
a) 3 b) 4 c) 2 d) 1
6. Precision can be expressed in terms of
a) Error b) Deviation
c) Confidence limit d) significant figure
7. Number of significant figures in 3.14 is
a) 1 b) 4 c) 2 d) 3
8. Accuracy can be expressed in terms of
a) Significant figure b) Deviation c) Confidence limit
d) Error
9. In calculation of molality, the quantity of solvent is expressed a
a) lit b) ml c) Kg d) cm^3
10. The number of significant figures in 0.00167 is

- a) 3 b) 6 c) 5 d) 2
11. The random error observation is
 a) Indeterminate error b) Determinate error
 c) Operative error d) Absolute error
12. The number of significant figure on 5.15g is
 a) 3 b) 2 c) 1 d) 4
13. Significant number of 0.00052 is _____.
 a) 2 b) 5 c) 6 d) 3
14. The significant figures of addition of 4.524, 2.1 and 6.34 is _____
 a) 3 b) 2 c) 1 d) 4

II.FILL UP THE BLANKS:

1. Relative error is -----
2. The formula for calculating standard deviation is -----
3. Confidence limit= -----
4. The random error observation is -----
5. Average deviation= -----
6. The confidence limit is expressed as -----
7. Precision means-----.
8. Precision is expressed as-----.

SECTION-B

2 MARKS

1. Explain the term significant figures.
2. What is average deviation?
3. Explain about confidence limit.
4. Define secondary standard.
5. Define precision
6. Define accuracy
7. What is mole fraction?
8. Explain the Error analysis with examples?
9. State any two differences between precision and accuracy.
10. Write the formula to calculate standard deviation for a small set of values.
11. Write the formula to calculate standard deviation for a large set of values.
12. What is the molarity of 5.30 g of Na_2CO_3 dissolved in 400.0 mL solution?
13. A student has used a set of uncalibrated weights to determine the weights of a sample. Identify the type of error committed.
14. Calculate the mean and median for 20.20, 20.08 and 20.01.
15. Calculate the average deviation for the set of values, 9.42, 38.02 and 38.22.
16. Solve, $0.132 \times 1.57 / 0.12$ using the rules of significant figures.

17. Find out the number of significant figures in a) 0.1357 and b) 1.01×10.2 .
18. Solve using the rules of significant figures $\{1.52 \times 30.12/28.1\} - 1.13 = ?$

SECTION-C

7 MARKS

1. Explain the terms with examples. a) precision b) accuracy c) error analysis
2. Find out the mean deviation about the mean for the following data: 18, 20, 12, 14, 19, 22, 26, 16, 19 and 24.
3. Find the SD of the following set of observations 45, 36, 40, 37, 39, 42, 45, 35, 40 and 39.
4. Write a note a standard deviation.
5. Explain the method of expressing precision.
6. An accurate value is also a precise value but a precise value need not be accurate, explain.
7. What are the types of error encountered in analytical measurements?
8. Solve using the rules of significant figures, $(51.1 \times 4.63 \times 10^{-4}) / (2.152 \times 2.631 \times 10^{-3}) = ?$
9. Solve using the rules of significant figures, $(1.508 \times 1.89 \times 10^{-5}) / (1.69 \times 9.132 \times 10^{-4}) = ?$
10. Calculate the standard deviation for the set of data 48.32, 48.36, 48.23, 48.11, and 48.38.
11. Calculate the standard deviation for the set of data 16.2, 16.3, 16.5, 16.4 and 16.1.

UNIT - II

I. CHOOSE THE CORRECT ANSWER:

1. In which of the following solution, phenolphthalein will give pink colour
a) Acidic b) Basic c) Neutral d) Both acidic and neutral
2. 1 mole of substance in 1000 ml is called as which solution
a) Molar b) Normal c) Molal d) All the above
3. Which is a primary standard
a) NaOH b) $\text{Ca}(\text{OH})_2$ c) $\text{K}_2\text{Cr}_2\text{O}_7$ d) HCl
4. When a substance is dissolved in gram equivalents, the concentration is expressed as -----
a) Molarity b) Molality c) Normality d) Mole fraction
5. The indicator used in complex metric titration is
a) Phenolphthalein b) EBT

12. In a solution, if you have 10 moles of solute and 90 moles of solvent, calculate the mole fraction for solute and solvent.

SECTION-C

7 MARKS

1. Explain primary and secondary standards with an example.
2. Explain about a) acid base titration b) theories of acid base indicators?
3. Explain what is redox titration?
4. Describe briefly complexometric titration.
5. Explain about Iodometric titration.
6. Write a note on quinonoid theory of indicator.
7. Discuss about Oswald theory of an indicator.
8. Briefly explain about redox indicator.
9. What is metal ion indicator?
10. Write a note on adsorption indicators.
11. Explain about choice of indicators.
12. Explain any one theory of indicators.
13. What is the molarity of a solution prepared by dissolving 75.5gms of KOH in 540ml solution?
14. When 30.0 moles of NaOH was dissolved in 2 lit of water, calculate its molarity.
15. When 10.0 moles of NaOH was dissolved in 3 lit of water, calculate its molarity.

UNIT –III

SECTION –A

I. CHOOSE THE CORRECT ANSWER:

1. Calculate the percentage composition of carbon in C_2H_5OH
a) 54% b) 13% c) 35% d) 46%
2. Find the molecular formula for CH_2O has six empirical formula units to make the compound, so multiply each number in the empirical formula by 6.
a) $C_6H_{12}O_6$ b) $C_{12}H_{24}O_{12}$ c) $C_6H_{12}O_{12}$ d) $C_{12}H_{12}O_{12}$
3. Which of the following substances has an empirical formula that is different from that of the others?
a) Erythrose b) Propionic acid c) Acetic acid d) Glucose
4. Which of the following has both empirical and molecular formula the same,

- a) Glucose c) Sucrose d) Benzene d) Naphthalene
5. Equivalent of NaOH is
 a) 40 b) 36 c) 63 d) 278
6. Equivalent of sulphuric acid is
 a) 98 b) 49 c) 392 d) 31.6
7. Which is the empirical formula for benzene?
 a) C₆H₆ b) (CH)_n c) C₅H₅ d) (CH₂)_n
8. The equivalent weight of K₂Cr₂O₇ is
 a) 98 b) 343 c) 94 d) 49
9. When 126Gms of Oxalic acid dissolved in 500 mL of water the concentration of a solution is
 a) N/2 b) 1 N c) 2N d) 4 N
10. When 100gms of NaOH is dissolved in 1litre of water the concentration of a solution is
 a) 2N b) 3N c) 2.5N d) 4N
11. Calculate the percentage composition of carbon in C₂H₅OH
 a) 52 % b) 13% c) 35% d) 46%
12. Equivalent mass of KMnO₄ in acidic medium is _____
 a) 31.6 b) 158 c) 52.67 b d) 79
13. The equivalent weight of K₂Cr₂O₇ is
 a) 98 b) 343 c) 94 d) 49

II.FILL UP THE BLANKS:

- The empirical formula for glucose is-----.
- The empirical formula for Naphthalene is-----.

SECTION- B

2 MARKS

- Define the law of conservation of energy.
- State law of conservation of mass.
- State law of reciprocal proportions.
- Determine the molecular formula of oxalic acid.
- Define Equivalent mass of an atom
- Find the equivalent mass of H₃PO₄ in

$$\text{Ca}(\text{OH})_2 + \text{H}_3\text{PO}_4 \rightarrow \text{CaHPO}_4 + 2 \text{H}_2\text{O}.$$
- Mention the uses of chloride method.
- How equivalent weight does determine?
- Calculate the equivalent weight for sodium hydroxide and sodium carbonate.

10. Write the law of constant composition & law of multiple proportions.
11. What is the % of water in washing soda ($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$)
12. Calculate the % composition of carbon in CO_2 .
13. Calculate the % composition of carbon in benzene.
14. Calculate the equivalent weight of H_2SO_4 and NH_4OH .
15. Calculate the equivalent weight of phosphorous acid.
16. In the determination of boiling point of a liquid, the experimental value is 93.8. If expected value is 95.C, calculate the % of error.
17. Calculate the equivalent weight for the following chemicals:
 - a) H_2SO_4 49.1 g/eq b) H_3PO_4 32.7 g/eq
 - c) $\text{Mg}(\text{OH})_2$ 29.2 g/eq d) NaOH 40.0 g/eq .

SECTION-C

7 MARKS

1. Explain Gay Lussac's law of gaseous volumes.
2. A sample of iron alloy on analysis gave values of 92.10, 92.72, 92.90 percentage of iron in the independent measurement.
3. Find out mean standard deviation and confidence limit.
4. Write a note on Gay Lussac's law of gaseous volumes.
5. Give an account on laws of reciprocal proportions examples.
6. Determine the equivalent mass of a compound by Hydrogen displacement method.
7. Determine the equivalent mass of a compound by Oxide method.
8. Determine the equivalent mass of a compound by Chloride method.
9. Determine the equivalent mass of a compound by Metal displacement method.
10. Describe double titration with an example.
11. Explain about back titration with an example.
12. Explain the concept of double titration.
13. Explain any three methods of determination of equivalent weight?
14. How to prepare 0.5N and 0.5M BaCl_2 solution in 250 ml volume having gram molecular mass 208 g.
15. In a sample, if 13.5 g Ca, 10.8 g of O and 0.675 g of H are present, calculate the empirical formula.
16. How to prepare 0.5N and 0.5M MgCl_2 solution in 500 ml volume having gram molecular mass 95.211 g.

UNIT-IV

SECTION-A

I. CHOOSE THE CORRECT ANSWER:

1. ----- is a device that converts alternating current (AC) into direct current (DC). a) Rectifier b) ripple c) filter d) transistor
2. ----- is a device that converts energy from one form to another.
a) transducers b) semiconductor c) conductor d) rectifier
3. The formula for calculating resistance is ----- . a) $V \times I$ b) V/I c) $C \times V$
d) C/V
4. High temperature measuring instruments are known as ----- .
a) Resistance thermometers b) Bimetallic thermometers c) Radiation pyrometers d) Vapor pressure thermometer
5. An example for potential divider is
a) Wiper b) Transformer c) Potentiometer d) Transistor
6. The potential difference is expressed as
a) Ampere b) volt c) waltz d) ohms
7. The instrument used for measuring pressure is
a) hydrometer b) manometer c) barometer d) sonometer
8. The resistance is measured in terms of
a) farads b) ohms c) volt d) ampere
9. Extrinsic semiconductor conducts electricity due to
a) heat b) metal c) impurity d) light
10. Which is the capable element to change high voltage low voltage?
a) semiconductor b) AC voltage c) DC voltage d) transformer
11. Integrated circuits are normally made of
a) aluminium b) copper c) silicon d) zinc
12. The conductivity for n-type semi conductor arises due to
a) Electrons b) Holes c) Both holes and electron d) SI^+ ions
13. Unit of pressure is
a) atm b) Nm^{-2} c) mm Hg d) All the above
14. Unit of temperature is
a) C^0 b) F^0 c) K d) All the above
15. The potential difference is expressed as
a) Ampere b) Volt c) Walt d) Ohms
16. The instrument used for measuring pressure is
a) Hydrometer b) Manometer
c) Barometer d) sonometer
17. Extrinsic semi conductor conducts electricity due to
a) Heat b) Metal c) Impurity d) Light

18. _____ is a device that converts energy from one form to another.
- a) Transducers b) Semiconductor
c) Conductor d) Rectifier

II.FILL UP THE BLANKS:

1. ----- is also called a coil or reactor
2. ----- is an example for primary standard
3. The oscilloscope is an important ----- device.
4. The unit for capacitance is -----
5. Photomultiplier tube is a -----
6. Silicon is usually function as -----
7. Unit of current is -----.
8. ----- is also called a coil or reactor.

SECTION-B

2 MARKS

1. Write a note on signal to noise ratio.
2. What is a semiconductor?
3. What is integrated circuit?
4. What is a rectifier?
5. What is a transistor?
6. What is a capacitor?
7. How does speed is measured?
8. How does a current measured?
9. What is an amplifier?
10. Define transformer and transducer.
11. State Operational amplifier.
12. How will you measure pressure?
13. What is the principle of transformer?
14. What is meant by inductor?
15. Give any two instruments to measure temperature.
16. Name any two instruments used to measure voltage and speed.
17. How much mass of NaOH required to prepare 0.5N solution in a volume of 500 ml.

SECTION-C

7 MARKS

1. Write a short note on signal to noise ratio.
2. Discuss the functions of different detectors.
3. Give any three instruments to measure pressure.
4. Give the principle, diagram and working manometer.
5. What are the energy losses of a transformer?

6. Give any 3 instruments for measuring pressure.
7. Give the symbol and two types of resistors with Diagram.
8. Discuss any 3 applications of resistors.
9. Explain the function of rectifiers.
10. Write a note on Oscilloscope recorder.
11. Write brief note on the following electronic Components.
i) resistors ii) capacitors iii) inductors iv) transistors
12. Explain about a) Transistors b) resistors.

Unit - V

I. CHOOSE THE CORRECT ANSWER:

1. In calculation of molality, the quantity of solvent is expressed as
a) lit b) ml c) Kg d) cm^3
2. $32.0 - 0.0664$ is -----
a) 31.9336 b) 31.9 c) 31.933 d) 31.93
3. $3.181 - 1.003$ is -----
a) 17.097 b) 17.0 c) 17.1 d) 17.09
4. Relative error can be expressed in
a) PPM b) PPT c) PPV d) PPL
5. Which is a reducing agent?
a) Oxalic acid b) $\text{K}_2\text{Cr}_2\text{O}_7$ c) $\text{NH}_2\text{-NH}_2$ d) O_2
6. When a solvent is in liters and the solute is in moles, the concentration is
Express as -----.
a) Molality b) Molarity c) Mole fraction d) Normality
7. Which is an oxidizing agent?
a) KMnO_4 b) LiAlH_4 c) $\text{NH}_2\text{-NH}_2$ d) CO_2
8. When a solvent in kilograms the concentration is expressed as
a) Molality b) Molarity c) Normality d) Mole fraction
9. Write the number of significant figure in the 2.5×3.42
a) 2 b) 3 c) 5 d) 6
10. The number of significant figure on 5.15g is
a) 3 b) 2 c) 1 d) 4

II. FILL UP THE BLANKS:

1. The value 1.064 rounded off to 2 significant figure is -----.
2. The value 18.764 rounded off to 3 significant figure is-----.
3. Relative error can be expressed is -----.
4. Relative error is -----.

5. The random error observation is-----.

Section – B

2 MARKS

1. What is significant figure? Give example.
2. What is relative error?
3. What is percentage of error?
4. Define molarity.
5. Define equivalent mass of an acid.
6. Define equivalent mass of a base.
7. Define equivalent mass of a salt.
8. Define equivalent mass of an oxidizing agent.
9. Define equivalent mass of a reducing agent.
10. Define chemical combination.
11. What is a reducing agent?
12. What is rounding off method?
13. What is an oxidizing agent? Give example.
14. Solve $0.4962 \times 18.1 / 20.00$ using the rules of significant figures.
15. Explain about a) Absolute error b) Percentage error with examples.
16. Find out the number of significant figures in a) 0.0300 and b) 25.0000.
17. In the determination of boiling point of a liquid, the experimental value is 89.1°C . If expected value is 88.7°C , calculate the % error.
18. In a gravimetric analysis of estimation of lead, if the true value is 0.2895 g and the experimental value is 0.2838 g. Calculate the % error.
19. In a gravimetric analysis of estimation of lead, if the true value is 0.2878 g and the experimental value is 0.2872 g. Calculate the % error.

Section – C

7 MARKS

1. What is relative error? Explain with suitable example.
2. What is percentage of error? Explain with suitable example.
3. a) 0.100 mole of NaCl is dissolved into 100.0 grams of pure H_2O . What is the mole fraction of NaCl?
b) A sulfuric acid solution containing 571.4 g of H_2SO_4 per liter of solution has a density of 1.329 g/cm^3 . Calculate the molality of H_2SO_4 in this solution?
c) What is the normality of a solution containing 0.40 mol of H_2SO_4 in 600 mL of solution?
