Step Academy official

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STUDENT NAME	
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SUBJECT	Chemistry
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Paper Type	

Q1. Choose the correct answer. **17X1=17**

1. How many times the mass of neutron is greater than that of electron:

(A) 1480 **(B)** 2000 **(C)** 200 **(D)** 1840

2. Mark the correct statement:

(A) The ionization energy of Calcium is lower than that of Magnesium

(B) The ionization energy of Calcium is lower than that of Barium

(C) The ionization energy of Calcium is higher than that of Beryllium

(D) The ionization energy of Calcium is lower than that of Strontium

3. 0.25 moles of phosphoric acid produce moles of H^+ ions:

(A) 0.25 moles **(B)** 0.75 moles **(C)** 1.5 moles **(D)** 0.5 moles

4. The number of atoms in 1.79 g of gold and g of sodium are equal:

(A) 0.023 **(B)** 23 **(C)** 230 **(D)** 2300

5. 48g of SO_4^{-2} has number of ions equal to:

(A) 6.02×10^{23} **(B)** 3.01×10^{24} **(C)** 3.01×10^{23} **(D)** 12.04×10^{23}

6. Equal volume of CO and N_2 are taken in identical condition, the correct relationship between masses of two gases is:

(A) $CO = N_2$ **(B)** $CO < N_2$ **(C)** $N_2 < CO$ **(D)** $CO > N_2$

7. The actual yield of a chemical reaction is mostly less than the theoretical yield. The most probable reason is:

(A) Mechanical loss due to filtration **(B)** Reaction is irreversible

(C) The rate of a chemical reaction is very slow

(D) The mechanism of the reaction is complicated

8. If absolute temperature of a gas is double and the pressure is reduced to one half, the volume of the gas will:

(A) Remain unchanged **(B)** Increase four times **(C)** Reduce to $\frac{1}{4}$ **(D)** Be doubled

9. Liquid droplets tend to assume a spherical shape:

(A) To maximize the surface area for interaction with the surroundings.

(B) To minimize the volume for a given surface area.

(C) To minimize the surface energy by having the smallest surface area for a given volume.

(D) Due to the influence of gravity pulling the liquid equally in all directions.

10. For an exothermic reaction, if the activation energy of the reverse reaction is greater than the activation energy of the forward reaction, what unusual condition does this imply?

(A) The reaction is very fast. **(B)** The reaction is at equilibrium. **(C)** The enthalpy change is positive **(D)** The catalyst is highly effective.

11. Why might the actual energy yield obtained by the body from metabolizing a food be slightly different from its calorie content measured in a calorimeter?

(A) Calorimeters are less efficient at measuring energy release.

(B) The body cannot completely digest and oxidize all components of the food.

(C) Calorie content includes the energy required for digestion itself.

(D) The body converts all energy directly into mechanical work with no heat loss.

12. Born Haber cycle is used to determine the:

(A) Lattice energy **(B)** Enthalpy of sublimation **(C)** Enthalpy of vaporization **(D)** Enthalpy of neutralization

13. The energy of activation for forward and backward reaction is always:

(A) Same **(B)** Different **(C)** May be same or different **(D)** Cannot be predicted

14. The preparation of H_2SO_4 by contact process is an example of:

(A) Autocatalysis **(B)** Homogeneous catalysis **(C)** Heterogeneous catalysis **(D)** Enzyme catalysis

15. Which of the followijng best describes a microscopic event in a gas reaction?

(A) Increase in pressure **(B)** Bubbling of gas **(C)** Collision of gas molecules **(D)** Expasion of the gas volume

16. The substance which increases the rate of reaction but remains unchanged at the end of the reaction is called:

(A) Indicator **(B)** Promotor **(C)** Catalyst **(D)** Activated complex

17. X rays were discovered by:

(A) Rutherford **(B)** Roentgen **(C)** Schrodinger **(D)** Moseley

Q2. Write short answers of the following questions. Any 8 **8X2=16**

1 . Why is the deflection of an alpha particle less than that of an electron in the same electric field?

2 . Why are electrons in 3d orbitals filled after the 4s orbitals? Explain with an example.

3 . What is the Aufbau principle? Give example.

4 . Calculate the number of moles of O, N, and Mg atoms in 9 g of $Mg(NO_3)_2$

5 . N_2 and CO have the same number of electrons, protons, and neutrons.

6 . What is the mass of CO_2 molecules in 10.0 grams of it?

7 . If two gases have the same density but different molar masses, what can you infer about their temperature or pressure?

8 . A gas occupies 22.4 L at STP. Can we always assume it contains 1 mole? Explain.

9 . If two gases have the same density but different molar masses, what can you infer about their temperature or pressure?

10 . Describe a method to verify experimentally if a solution is exactly 1.0 M.

11 . One mole of CO_2 and NO_2 have the same number of molecules. Why?

12 . Why is molarity temperature-dependent, but molality is not?

Q3. Write short answers of the following questions. Any 8 **8X2=16**

1 . Why does wind increase the rate of evaporation of a liquid?

2 . Evaporation takes place at all temperatures. Explain.

3 .

In a closed container, if the temperature of the container increased, how will this equilibrium shift, and what will be the effect on the vapor pressure of the liquid?

4 . How the rate of evaporation depends on the surface area?

5 . What specific changes during the conversion of a liquid to a solid?

6 . How the amount of lattice energy of an ionic compound depends upon the size of cation and anion (charge densities of the ions)?

7 . Rate of reaction changes with time. Why?

8 . Describe how surface area affects rate of reaction?

9 . How does the increase of temperature increases the rate of the chemical reactions?

10 . Explain zero order reaction?

11 . Can a physical equilibrium exist in an open system? Why or why not?

12 . The reaction $N_2 + O_2 \rightleftharpoons 2NO$ is not affected by change in pressure why?

Q4. Write short answers of the following questions. Any 6 **6X2=12**

1 . What are closed chain hydrocarbon give example.

2 . What is homolytic fission? Give it reaction.

3 . Describe the general reaction of halogens with hydrogen.

4 . What are the common forms of chlorine and disadvanyage of using it in water treatment?

5 . What are the five main layers of the atmosphere in order from Earth's surface upward?

6 . How does smog affect human health?

7 . Why should you never work alone in the chemistry lab?

8 . Describe how to treat a minor chemical burn.

9 . Why is dilute HNO_3 used before adding $AgNO_3$?

Q5. Write short answers of the following questions. Any 6 **6X4=24**

1 . Explain the difference between the atomic number and the nucleon number of an atom.

2 . What is the importance of Moseley's law?

3 . Explain the hybridization in NH_3 and its shape.

4 . Prove that one mole of each N_2, CO_2, and H_2 contains an equal number of molecules.

5 . Explain why adding more water to a solution dosn't change its mass of solute.

6 . Law of conservation of mass has to be obeyed in stoichiometric calculations. How?

7 . Evaporation takes place at all temperatures. Explain.

8 . State Hess's law of constant heat summation.

9 . Explain zero order reaction?

10 . State the Le-Chatelier's principle.