60 Most Missed Chemistry Regents Exams Questions

1. In the wave-mechanical model, an orbital is a region of space in an atom where there is
   (1) a high probability of finding an electron
   (2) a high probability of finding a neutron
   (3) a circular path in which electrons are found
   (4) a circular path in which neutrons are found

2. What is the charge of the nucleus in an atom of oxygen-17?
   (1) 0 (2) –2 (3) +8 (4) +17

3. Helium is most likely to behave as an ideal gas when it is under
   (1) high pressure and high temperature (2) high pressure and low temperature
   (3) low pressure and high temperature (4) low pressure and low temperature

4. At STP, the element oxygen can exist as either O_2 or O_3 gas molecules.
   These two forms of the element have
   (1) the same chemical and physical properties
   (2) the same chemical properties and different physical properties
   (3) different chemical properties and the same physical properties
   (4) different chemical and physical properties

5. In a nuclear fusion reaction, the mass of the products is
   (1) less than the mass of the reactants because some of the mass has been converted to energy.
   (2) less than the mass of the reactants because some of the energy has been converted to mass.
   (3) more than the mass of the reactants because some of the mass has been converted to energy.
   (4) more than the mass of the reactants because some of the energy has been converted to mass.

6. Which pair of formulas represents two compounds that are electrolytes?
   (1) HCl and CH_3OH (3) C_5H_{12} and CH_3OH
   (2) HCl and NaOH (4) C_5H_{12} and NaOH

7. Which compound could serve as a reactant in neutralization reaction?
   (1) NaCl (2) KOH (3) CH_3OH (4) CH_3CHO

8. How many electrons are contained in an Au^{3+} ion?
   (1) 76 (2) 79 (3) 82 (4) 197

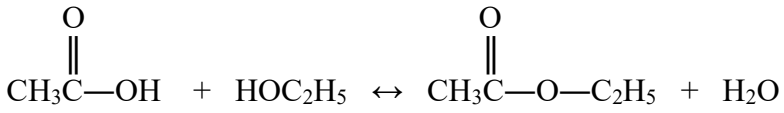
9. Which type of molecule is CF_4?
   (1) polar, with a symmetrical distribution of charge
   (2) polar, with an asymmetrical distribution of charge
   (3) nonpolar, with a symmetrical distribution of charge
   (4) nonpolar, with an asymmetrical distribution of charge

10. Conductivity in a metal results from the metal atoms having
    (1) high electronegativity (2) high ionization energy
    (3) highly mobile protons in the nucleus (4) highly mobile electrons in the valence shell

11. Which of these elements has the least attraction for electrons in a chemical bond?
    (1) oxygen (2) fluorine (3) nitrogen (4) chlorine

12. Given the reaction for the corrosion of aluminum: $4Al + 3O_2 \rightarrow 2Al_2O_3$
    Which half-reaction correctly represents the oxidation that occurs?
    (1) $Al^\circ + 3e^{-1} \rightarrow Al^{3+}$ (2) $Al^\circ \rightarrow Al^{3+} + 3e^{-1}$
    (3) $O_2^\circ + 4e^{-1} \rightarrow 2O^{2-}$ (4) $O_2^\circ \rightarrow 2O^{2-} + 4e^{-1}$

13. Given the reaction:



    This reaction is an example of
    (1) fermentation (2) saponification (3) hydrogenation (4) esterification

14. Systems in nature tend to undergo changes toward
    (1) lower energy and lower entropy (2) lower energy and higher entropy
    (3) higher energy and lower entropy (4) higher energy and higher entropy

15. Which molecule contains a nonpolar covalent bond?
    (1) O=C=O (2) Br–Br (3) C≡O (4) CCl_4

16. Which equation represents a fusion reaction?
    (1) $H_2O_{(G)} \rightarrow H_2O_{(L)}$ (2) $C_{(S)} + O_{2(G)} \rightarrow CO_{2(G)}$
    (3) $^2_1H + ^3_1H \rightarrow ^4_2He + ^1_0n$ (4) $^{235}_{92}U + ^1_0n \rightarrow ^{142}_{56}Ba + ^{91}_{36}Kr + 3^1_0n$

17. Compared to a 0.1 M aqueous solution of NaCl, an 0.8 M aqueous solution of NaCl has a
    (1) higher boiling point & a higher freezing point
    (2) higher boiling point & a lower freezing point
    (3) lower boiling point and a higher freezing point
    (4) lower boiling point and a lower freezing point

18. The kinetic molecular theory assumes that the particles of an ideal gas
    (1) are in random, constant, straight-line motion
    (2) are arranged in a regular geometric pattern
    (3) have strong attractive forces between them
    (4) have collisions that result in the system lowering energy

19. At STP, solid carbon can exist as graphite or as diamond. These two forms of carbon have
(1) the same properties and the same crystal structures
(2) the same properties and different crystal structures
(3) different properties and the same crystal structures
(4) different properties and different crystal structures

20. According to Reference Table G, which substance forms an unsaturated solution when 80 grams of the substance is dissolved in 100 grams of H_2O at 10°C?
(1) KI (2) KNO_3 (3) $NaNO_3$ (4) NaCl

21. Where does oxidation occur in an electrochemical cell?
(1) at the cathode in both an electrolytic and a voltaic cell
(2) at the cathode in an electrolytic cell and at the anode in a voltaic cell
(3) at the anode in both an electrolytic cell and a voltaic cell
(4) at the anode in an electrolytic cell and at the cathode in a voltaic cell

22. What is the formula of titanium(II) oxide? (1) TiO (2) TiO_2 (3) Ti_2O (4) Ti_2O_3

23. A 1.0-gram piece of zinc reacts with 5 milliliters of HCl(aq). Which of these conditions of concentration and temperature would produce the greatest rate of reaction?
(1) 1.0 M HCl(aq) at 20.°C (2) 1.0 M HCl(aq) at 40.°C
(3) 2.0 M HCl(aq) at 20.°C (4) 2.0 M HCl(aq) at 40.°C

24. Which equation represents a transmutation reaction?
(1) $^{239}_{92}U \rightarrow {}^{239}_{92}U + {}^{0}_{0}\gamma$
(2) $^{14}_{6}C \rightarrow {}^{14}_{7}N + {}^{0}_{-1}e$
(3) $C_3H_8 + 5\ O_2 \rightarrow 3\ CO_2 + 4\ H_2O$
(4) $n\ C_2H_4 \xrightarrow{\text{catalyst}} (—C_2H_4—)_n$

25. Given the balanced ionic equation: $Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$
Which equation represents the oxidation half-reaction?
(1) $Zn_{(s)} + 2e^- \rightarrow Zn^{2+}{}_{(AQ)}$ (2) $Zn_{(s)} \rightarrow Zn^{2+}{}_{(AQ)} + 2e^-$
(3) $Cu^{2+}{}_{(AQ)} \rightarrow Cu°_{(s)} + 2e^-$ (4) $Cu^{2+}{}_{(AQ)} + 2e^- \rightarrow Cu°_{(s)}$

26. As a chlorine atom becomes a negative ion, the atom
(1) gains an electron and its radius increases (2) gains an electron and its radius decreases
(3) loses an electron and its radius increases (4) loses an electron and its radius decreases

27. Which symbol represents a particle that has the same total number of electrons as S^{2-}?
(1) O^{2-} (2) Si (3) Se^{2-} (4) Ar

28. Given the balanced equation: $KNO_{3(S)} + H_2O_{(L)} + 34.89kJ \rightarrow K^+_{(AQ)} + NO_3^-{}_{(AQ)}$
Which statement best describes this process? It is
(1) endothermic and entropy increases (2) endothermic and entropy decreases
(3) exothermic and entropy increases (4) exothermic and entropy decreases

29. Atoms of different isotopes of the same element differ in their total number of
(1) electrons (2) neutrons (3) protons (4) valence electrons

30. Which balanced equation represents a redox reaction?
(1) $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$ (2) $BaCl_2 + K_2CO_3 \rightarrow BaCO_3 + 2KCl$
(3) $CuO + CO \rightarrow Cu + CO_2$ (4) $HCl + KOH \rightarrow KCl + H_2O$

31. A saturated solution of $NaNO_3$ is prepared at 60.°C using 100. grams of water. As this solution is cooled to 10.°C, $NaNO_3$ precipitates (settles) out of the solution. The resulting solution is saturated. Approximately how many grams of $NaNO_3$ settled out of the original solution?
(1) 46 g (2) 61 g (3) 85 g (4) 126g

32. What is the IUPAC name for the compound with this condensed structural formula $CH_3CH_2CH_2CHO$? (1) butanal (2) butanol (3) propanal (4) propanol

33. A student tested a 0.1 M aqueous solution and made the following observations:
1, Conducts electricity 2, Turns blue litmus red 3, Reacts with $Zn_{(S)}$ to produce gas bubbles
Which compound could be the solute in this solution?
(1) CH_3OH (2) LiBr (3) HBr (4) LiOH

34. What is the half-life of sodium-25 if 1.00 grams of a 16.00-gram sample of sodium-25 remains unchanged after 237 seconds?
(1) 47.4 s (2) 59.3 s (3) 79.0 s (4) 118 s

35. Given the table below that shows students' examples of proposed models of the atom:

Proposed Models of the Atom

Model	Location of Protons	Location of Electrons
A	in the nucleus	specific shells
B	in the nucleus	regions of most probable location
C	dispersed throughout the atom	specific shells
D	dispersed throughout the atom	regions of most probable location

Which model correctly describes the locations of protons and electrons in the wave-mechanical model of the atom? (1) A (2) B (3) C (4) D

36. Which reactants form the salt $CaSO_4(s)$ in a neutralization reaction?
(1) $H_2S_{(G)}$ and $Ca(ClO_4)_{2(S)}$ (2) $H_2SO_{3(AQ)}$ and $Ca(NO_3)_{2(AQ)}$
(3) $H_2SO_{4(AQ)}$ and $Ca(OH)_{2(AQ)}$ (4) $SO_{2(G)}$ and $CaO_{(S)}$

37. A metal, M forms an oxide compound with the general formula M_2O. In which group on the Periodic Table could metal M be found?
(1) Group 1 (2) Group 2 (3) Group 16 (4) Group 17

38. What volume of 0.500 M $HNO_{3(AQ)}$ must completely react to neutralize 100.0 milliliters of 0.100 M $KOH_{(AQ)}$
(1) 10.0 mL (2) 20.0 mL (3) 50.0 mL (4) 500. mL

39. Given the balanced equation with an unknown compound represented by X:
$C_6H_{12}O_{6(AQ)} \rightarrow 2\ X + 2\ CO_{2(G)}$ Which compound is represented by X ?
(1) $CH_3OH_{(AQ)}$ (2) $CH_2(OH)_{4(AQ)}$ (3) $CH_3CH_2OH_{(AQ)}$ (4) $CH_2OHCH_2OH_{(AQ)}$

40. Which statement correctly describes the 2 forms of oxygen, O_2 & O_3? They have
(1) identical molecular structures and identical properties.
(2) identical molecular structures and different properties.
(3) different molecular structures and identical properties.
(4) different molecular structures and different properties.

41. What is the total number of electrons shared in the bonds between the 2 carbon atoms in a molecule of H—C≡C—H? (1) 6 (2) 2 (3) 3 (4) 8

42. Which changes occur as a cadmium atom, Cd, becomes a cadmium ion, Cd^{2+}?
(1) The Cd atom gains two electrons and its radius decreases.
(2) The Cd atom gains two electrons and its radius increases.
(3) The Cd atom loses two electrons and its radius decreases.
(4) The Cd atom loses two electrons and its radius increases.

43. The compounds CH_3OCH_3 and CH_3CH_2OH are isomers of each other. These two compounds must have the same
(1) density (2) reactivity (3) melting point (4) molecular formula

44. Which process occurs at the anode in an electrochemical cell? The
(1) loss of protons (2) loss of electrons (3) gain of protons (4) gain of electrons

45. Which substance is an electrolyte?
(1) CH_3OH (2) $C_6H_{12}O_6$ (3) H_2O (4) KOH

46. Which ion is the only negative ion present in an aqueous solution of an Arrhenius base?
(1) hydride ion (2) hydrogen ion (3) hydronium ion (4) hydroxide ion

47. A dilute, aqueous potassium nitrate solution is best qualified as a
(1) homogeneous compound (2) homogeneous mixture
(3) heterogeneous compound (4) heterogeneous mixture

48. Which energy conversion occurs during the operation of a voltaic cell?
(1) Chemical energy is spontaneously converted to electrical energy.
(2) Chemical energy is converted to electrical energy only when an external power source is provided.
(3) Electrical energy is spontaneously converted to chemical energy
(4) Electrical energy is converted to chemical energy only when an external power source is provided.

49. Which balanced equation represents nuclear fusion?
(1) ${}^{1}_{0}n + {}^{235}_{92}U \rightarrow {}^{142}_{56}Ba + {}^{91}_{36}Kr + 3\,{}^{1}_{0}n$ (2) ${}^{236}_{88}Ra \rightarrow {}^{222}_{86}Rn + {}^{4}_{2}He$
(3) ${}^{6}_{3}Li + {}^{1}_{0}n \rightarrow {}^{3}_{1}H + {}^{4}_{2}He$ (4) ${}^{2}_{1}H + {}^{3}_{1}H \rightarrow {}^{4}_{2}He + {}^{1}_{0}n$

50. Which electron configuration could represent a strontium atom in an excited state?
(1) 2−8−18−7−1 (2) 2−8−18−7−3 (3) 2−8−18−8−1 (4) 2−8−18−8−2

51. At STP, which element is brittle and not a conductor of electricity?
(1) S (2) K (3) Na (4) Ar

52. Compared to an electron in the first electron shell of an atom, an electron in the third shell of the same atom as (1) less mass (2) less energy (3) more mass (4) more energy

53. At which Celcius temperature does lead change from a solid to a liquid?
(1) 874 ºC (2) 601 ºC (3) 328 ºC (4) 0 ºC

54. Information related to a titration experiment is given in the balanced equation and table below.

$$H_2SO_{4(AQ)} + 2\,KOH_{(AQ)} \rightarrow K_2SO_{4(AQ)} + 2\,H_2O_{(L)}$$

Titration Experiment Results

volume of $H_2SO_{4(AQ)}$ used	12.9 mL
concentration of $H_2SO_{4(AQ)}$	?
volume of $KOH_{(AQ)}$ used	36.0 mL
concentration of $KOH_{(AQ)}$	0.16 M

Based on the equation and the titration results, what is the concentration of the $H_2SO_{4(AQ)}$?
(1) 0.12 M (2) 0.16 M (3) 0.24 M (4) 0.96 M

55. Which radioisotope is used in medicine to treat thyroid disorders?
(1) cobalt-60 (2) iodine-131 (3) phosphorus-32 (4) uranium-238

56. What is the total charge on the nucleus of a carbon atom?
(1) −6 (2) 0 (3) +6 (4) +12

57. What is the name of the polyatomic ion in the compound Na_2O_2 ?
(1) hydroxide (2) oxalate (3) oxide (4) peroxide

58. For a given reaction, adding a catalyst increases the rate of the reaction by
(1) providing an alternate reaction pathway that has a higher activation energy
(2) providing an alternate reaction pathway that has a lower activation energy
(3) using the same reaction pathway and increasing the activation energy
(4) using the same reaction pathway and decreasing the activation energy

59. Using your knowledge of chemistry and the information in Reference Table H, which statement concerning propanone and water at 50°C is true? Propanone has a
(1) higher vapor pressure and stronger intermolecular forces than water.
(2) higher vapor pressure and weaker intermolecular forces than water.
(3) lower vapor pressure and stronger intermolecular forces than water.
(4) lower vapor pressure and weaker intermolecular forces than water.

60. In a nuclear fusion reaction, the mass of the products is
(1) less than the mass of the reactants because some of the mass has been converted to energy
(2) less than the mass of the reactants because some of the energy has been converted to mass
(3) more than the mass of the reactants because some of the mass has been converted to energy
(4) more than the mass of the reactants because some of the energy has been converted to mass