

125 Things You Can't Get Wrong On The Regents Exam!

For each question, provide a way of knowing the answer or how to look it up. Provide your own examples where appropriate.

Atomic Structure

1. What is the location of each subatomic particle?
2. How many protons does element X have?
3. How many neutrons does element X have?
4. How many electrons does **ATOM** X have?
5. How many electrons does **ION** X have?
6. Which subatomic particles have a value of one atomic mass unit?
7. What is the mass of element X?
8. What is element X's nuclear charge?
9. What is element X atomic number?
10. Define isotopes in terms of subatomic particles.
11. How is spectra produces in terms of energy levels and subatomic particles?
12. Draw the Bohr diagram of element X.

Periodic Table

13. What is the name of the group with X valence electrons?
14. What element has similar properties to element X?
15. As you go across a period explain what happens to atomic radius and why.

16. As you go across a period explain what happens to ionization energy and why.
17. As you go across a period explain what happens to electronegativity and why.
18. As you go down a group explain what happens to atomic radius and why.
19. As you go down a group explain what happens to ionization energy and why.
20. As you go down a group explain what happens to electronegativity and why.
21. Which element has the greatest tendency to attract electrons?
22. Which element requires the most energy to lose its most loosely bound electron?
23. Locate the metals, nonmetals, and metalloids and define their properties.
24. Which element(s) tend(s) not to bond? Why?

Bonding

25. What type of substances cannot be broken down by chemical change?
26. In terms of products formed, state the difference between and physical and chemical reaction.
27. In terms of types of elements define ionic, covalent and metallic bonds.
28. In terms of electrons define ionic, covalent and metallic bonds.
29. In terms of conducting electricity define ionic, covalent and metallic bonds.
30. Which compounds exhibit two types of bonding?
31. When a bond is broken, is energy absorbed or released?
32. What elements is a compound would create the most polar bond? And the least polar?
33. Draw the following molecules' Lewis Structures: H_2O , CH_4 , NH_3 , H_2 , HCl , CO_2 .

34. For the above, determine if they are polar molecules and if so, show their poles.

35. Explain if compound XY will dissolve in water based on polarity.

36. What types of forces does water have and why are they so strong?

Moles

37. What is the gram formula mass of XY?

38. How many moles of atoms are in XY_2Z ?

39. How many moles of XY (gram formula mass =42g/mol) are present in an 84 gram sample?

40. What is the classification of the reactions:

$X + Y \rightarrow XY$	$XY \rightarrow X + Y$
$XY + Z \rightarrow XZ + Y$	$MX + YZ \rightarrow MZ + XY$

41. If 3.00 grams of X react with 5.00 grams of Y, how many grams of XY form?

42. In all chemical reactions, what three things are always conserved?

43. What is the empirical formula of X_2Y_4 ?

44. What is the molecular formula of compound XY (gfm =42 g/mol) if the molecular mass equals 84 g/mol?

45. What element has the lowest density?

Heat

46. What is a measure of kinetic energy?

47. In terms of kinetic and potential energy, what happens during a phase change?

48. In terms of kinetic and potential energy, what happens are the temperature of a solid substances rises?

49. Calculate the heat involved when 100 grams of water changes from 10 to 100°C.

50. Calculate the heat involved when 100 grams of water changes from the gas to the liquid phase.
51. Calculate the heat involved when 100 grams of water changes from the liquid to the solid phase.
52. Is the specific heat of most metals' higher or lower than water's specific heat? Explain.
53. Which reaction on Table I releases the most heat?
54. Which salt, when dissolved in water, absorbs the most heat?
55. Describe sublimation.

Gases

56. According to Kinetic Molecular Theory, how are gas particles arranged?
57. According to Kinetic Molecular Theory, what conditions make a gas behave ideally?
58. According to Kinetic Molecular Theory, what conditions cause a gas to deviate from ideal gas behavior?
59. What is standard temperature and pressure?
60. Which gas diffuses the fastest?
61. As pressure increases, what happens to the volume of a gas?
62. What relationship do pressure and temperature have in the gas phase?
63. As temperature increases, what happens to the volume of a gas?
64. What conditions of temperature and pressure cause a gas to be the least soluble?
65. If two gases at the same temperature and pressure have the same volume, what else is equal?

Solutions

66. What type of matter can be separated using physical means such as filtration and distillation?

67. How does distillation separate matter?
68. Is compound XY soluble?
69. If a solute dissolves in a solution, is it heterogeneous or homogeneous? What symbol will it have?
70. What is the vapor pressure of water at 50°C?
71. Which compound on table H has the weakest intermolecular forces of attraction?
72. Which saturated salt is the most concentrated at 30°C?
73. Which gas is the least soluble at 80°C?
74. Is the solution of 10g of XY at 10°C saturated, unsaturated or supersaturated?
75. Calculate the parts per million of 0.010 grams of Cl₂ in 10000 grams of water.
76. What affect does adding a solute have on the boiling point of water?
77. What affect does adding a solute have on the freezing point of water?

Kinetics

78. In terms of collision theory, what factors can increase the rate of reaction?
79. In terms of activation energy, what can a catalyst do the rate of a reaction?
80. In terms of heat or reactants and products, explain how the heat of reaction is calculated.
81. In terms of LeChatelier's Principle, explain why when Nitrogen is added to synthesize water at equilibrium, hydrogen decreases in concentration.
82. Define equilibrium in terms of quantities of reactants and products.
83. Define equilibrium in terms of rate of reactions.

84. When a gas is added to a system at equilibrium, explain why the reaction shifts to the side with less moles.

Organic

85. What are organic compounds?

86. What are hydrocarbons?

87. What is the general formula of an alkane?

88. How many electrons are shared per bond in an alkyne?

89. What compound(s) are saturated hydrocarbons?

90. In terms of polarity, which functional groups could dissolve in water?

91. Define isomers in terms of molecular and structural formulas.

92. What type of organic reaction forms only one product from a hydrocarbon with multiple bonds?

93. What type of organic reaction forms soaps? Alcohols? Plastics? Esters?

Acids and Bases

94. What property allows a substance to be classified as an electrolyte?

95. What ion is always formed when an acid is dissolved in water?

96. What ions is the only negative ion present when a base dissolves in water?

97. Define and give an example of a neutralization reaction.

98. What is the pH range for acids? And for bases?

99. If the pH decreases by a factor of 100, what happens to the concentration of hydronium ions?

100. What is the color of phenolphthalein when mixed with NaOH?

101. What is the name of the process used to determine the concentration of an unknown acid or base?

Redox

102. How can you determine if a reaction is redox?

103. In terms of oxidation numbers, what happens if an element is oxidized?

104. In terms of electrons what happens when an element is reduced?

105. What happens to all the subatomic particles when a redox reaction takes place?

106. In which electrode's half-cell does oxidation take place?

107. Which element is the best at oxidizing?

108. Electrons always travel through what device and from which electrode?

109. What is the purpose of the salt bridge?

110. In terms of spontaneity, describe a voltaic cell.

111. Which electrode always gains mass?

112. In terms of electrical & chemical energy, explain the difference between a voltaic and electrolytic cell.

113. What is the purpose of the battery in an electrolytic cell?

Nuclear

114. Why do some isotopes release particles from the nucleus?

115. Which emission is the most massive?

116. Which emission is not affected by a magnetic or electric field?

117. Which emission has the greatest penetrating power?

118. What decay mode will element X have?
119. What is the half-life of element X?
120. Which radioisotope is the most stable on table N?
121. Which isotope is used to treat the thyroid? Date rocks? Date organic material? Treat cancer?
122. In terms of reactants, what is the major difference between natural and artificial transmutation?
123. In terms of large and small atoms, state the difference between fission and fusion.
124. In terms of energy needed, what is the difference between fission and fusion?
125. Name one benefit and one risk of using radioactive elements.

Acronyms/Sayings

These are hints to remember things, not reasons why they happen. Do not answer a question using these statements.

- “Think like a proton, be positive.”
- “Chemists like balance and zeros. Everything is conserved.”
- “Everything is high to low: e- move from high to low energy levels to give off spectra, heat transfers from high to low energy, e- are transferred from elements high to low on Table J...”
- BARF (Break Absorb, Release Form)
- “Polar Bonds mean polar opposites. Their electronegativity difference is very high.”
- “Like dissolve like. Polar solvents dissolve polar solutes. This is why polar bears are dying. They are dissolving in the North waters (not really)”
- Hydrogen bonds are FON.
- PLIGHT (Pressure Low Ideal Gases High Temperature)
- “Ideal gases are like ideal boyfriends: hot and low pressure.”
- “If temperature is involved, its probably a direct relationship. Except with gas solubility!”
- SSS (Saturated Single Bonds Substitution: Organic chemistry)
- BAAD (Bases Accept (p+ or H+), Acids Donate)
- LION (Loss (of e-) Increases Oxidation Number)
- LEO and GER (Lose Electrons Oxidation, Gain Electrons Reduction)
- AN Ox and RED CAT (Anode Oxidation, Reduction Cathode)
- “RED CAT gets fat” (reduction Cathode gains mass)
- “Fission fizzes and breaks apart like Alka-Seltzer. Fusion fuses together like fusing bones or metal.”