ANSWERS to the 76 Past Chemistry Regents Exams Most Frequently Missed Questions

1. A. a high probability of finding an electron
2. C. +8 (every atom of oxygen in the universe)
3. B. high pressure & low temperature makes any gas most ideal
4. D. different chemical and physical properties (allotropes)
5. A. less than the mass of the reactants because some mass has been converted to energy

6. B. HCl and NaOH both form ions in solution

7. B. KOH (you need an acid or a base, this is a base)
8. A. 76. All gold atoms have 79 protons and electrons, this is a +3 cation.

9. B. Propanone has a higher vapor pressure and weaker intermolecular forces than water.
10. A. less than the mass of the reactants because some mass has been converted to energy

11. C. nonpolar, with a symmetrical distribution of charge
12. D. highly mobile electrons in the valence shell

13. C. nitrogen the lowest electronegativity of the four choices is nitrogen

14. B. $Al \rightarrow Al^{3+} + 3e^-$ that is the oxidation of aluminum.
15. D. esterification (sometimes dehydration synthesis)
16. B. lower energy and higher entropy

17. B. Br−Br is the only nonpolar bond here
18. C. Is the only fusion here
19. B. higher boiling point and a lower freezing point (more particles in solution)

20. A. are in random, constant, straight line motion
21. D. different properties and different crystal structures (allotropes!)
22. A. KI takes 135 grams to saturate this water.
23. C. at the anode in both an electrolytic cell and a voltaic cell

24. A. TiO the roman numeral II means +2 cation.

25. D. 2.0 M $HCl_{(AQ)}$ at 40.ºC hotter and stronger makes a faster reactions because they make for more collisions of particles.

26. B. $^{14}_{6}C \rightarrow {}^{14}_{7}N + {}^{0}_{-1}e$ only in this reaction does one atom become a different one.

27. B. $Zn_{(S)} \rightarrow Zn^{2+}_{(AQ)} + 2e^-$ this is LEO, loss of electrons
28. A. gains an electron + its radius increases anions are larger than atoms they form from.

29. D. Ar sulfide anions have 2-8-8 = 18 electrons. Argon has a 2-8-8 also
30. A. energy is absorbed, more particles, more entropy

31. B. neutrons are different
32. C. $CuO + CO \rightarrow Cu + CO_2$ is the only one with changing oxidation numbers.

33. A. 46 grams my calculations show this: 125 g – 80 grams = 45 grams. Pick best answer
34. A. Butanal a four carbon aldehyde must be butanal

35. C. HBr, it has to be ionic, acidic, and contain hydrogen for the SR reaction.
36. B. 59.3 seconds, four "half- lifes" = 237 seconds. 237 ÷ 4 = 59.25 with 3 SF

37. B. protons in nucleus (good), electrons in zones or regions of likely location (good).

38. B. $H_2SO_{3(AQ)} + Ca(NO_3)_{2(AQ)} \rightarrow CaSO_{4(S)} +$ water

39. A. Group 1, it makes a +1 cation for the 2:1 ration with oxide. (like Na^{+1})
40. $(\#H^{+1})(M_AV_A) = (M_BV_B)(\#OH^{-1})$ solve for M_A = 20.0 mL

41. C. $CH_3CH_2OH_{(AQ)}$ it's fermentation, sugar makes carbon dioxide and ETHANOL

42. They have different molecular structures and different properties (allotropes again)

43. A. six total electrons, (this is three bonds, but who cares?)

44. C. The Cd atom loses 2 electrons and its radius decreases. It loses a whole orbital when it loses 2 electrons and becomes more positive.

45. D. Molecular (or chemical) formula is C_2H_6O No chemical properties are the same.

46. B. the loss of electrons (Leo is a RED CAT) reduction happens ON the cathode.
47. D. KOH, only one with ions in solution.

48. D. In the base it's hydroxide. In the acid it is H^{+1} (or the dreaded H_3O^{+1} hydronium!)
49. B. Homogeneous mixture. The compound is pure, but this is dissolved in water.

50. A. Chemical energy is spontaneously converted to electrical energy.
51. D. $^{2}_{1}H + {}^{3}_{1}H \rightarrow {}^{4}_{2}He + {}^{1}_{0}n$

52. B. 2−8−18−7−3 the 4th orbital should be full before the 5th one opens up.
53. A. S, sulfur is the nonmetal solid here. Argon is a gas.

54. C. More energy, higher the orbital, the higher the energy level.
55. C. 328 ºC is the best answer. According to the reference tables, this is the best answer. Lead metal melts at 600 K which needs to be converted to 327 ºC.

56. C. 0.24M is the best answer here. $(2)(M_AV_A) = (M_BV_B)\ (1)$
this is a diprotic acid and a "single" ion base.

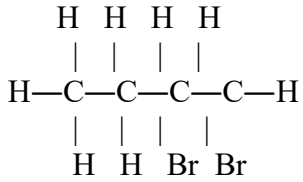
57. B. Iodine-131 for diagnosing thyroid illnesses, not treating any disease.
58. C. +6, carbon atoms are neutral, but their nucleus has six protons & six neutral neutrons
59. D. peroxide, it's on table E.

60. B. providing an alternate reaction pathway that has a lower activation energy, or just lowering the activation energy, both could be correct.

61. $2Ag^{+1} + 2e^{-} \rightarrow 2Ag^{\circ}$

62. $(1)(M_AV_A) = (M_BV_B)(1)$ so: $(M_A)(60.0\ mL) = (0.30M)(4B.2\ mL)$
solve for Molarity of acid. M = 0.21 M 2SF

63. This was an addition reaction.



64. $(1)(M_AV_A) = (M_BV_B)(2)$ this is a monoprotic (single ion) acid with a "double ion base". Multiply the base side of the equation by B. You would need half as many moles of this base to neutralize the acid. So, you need 0.024 moles magnesium hydroxide.

65. Substances that sublime move from solid to gas phase without becoming liquids first. To do this at room temperature, this naphthalene must not be held too tightly by intermolecular forces, for if it were, it would not sublime at such low temperatures. Since it's also a nonpolar substance, since water is polar, and like dissolves like, it won't dissolve that well in water.

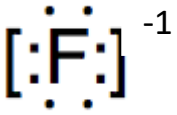
66. This is the setup for this, let's put everything where it goes, solve for V_B.

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

$$\frac{(100.8\text{ kPa})(5B.5\text{ L})}{295\text{ Kelvin}} = \frac{(45.6\text{ kPa})(V_2)}{252\text{ Kelvin}}$$

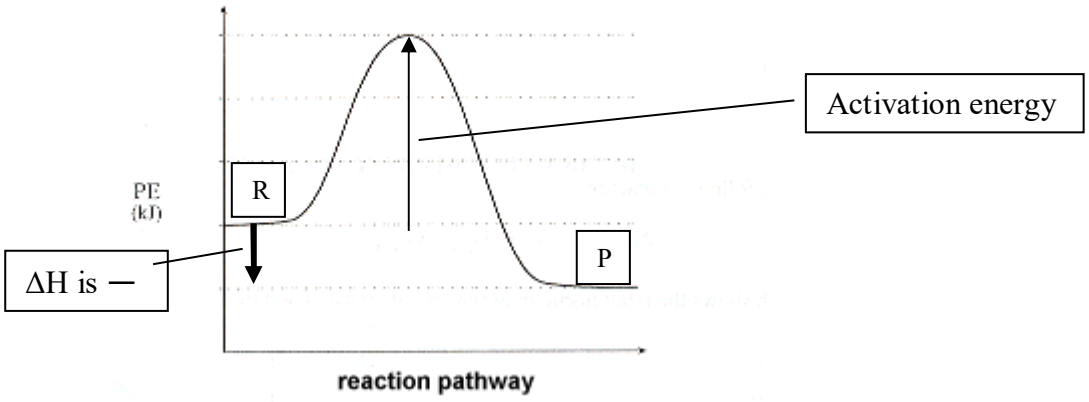
$$(13452)V_2 = 1{,}333{,}584$$

$V_2 = 99.1364\ldots =$ 99.1 Liters (3 SF)

67. 

68. (Mass) x (percent as a decimal) = the partial masses, then sum.
19.99 x 0.909 = 18.17091
20.99 x 0.003 = 0.06297
21.99 x 0.088 = 1.93512
20.169 amu = 20 amu with 1 SF

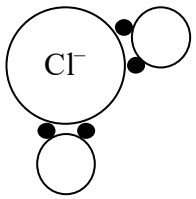
69. This is exothermic.
An increased temp favors the reverse reaction, which means more ammonia is used up.



70. An unsaturated hydrocarbon + halogen is an addition reaction.

71. The gold foil experiment concluded for Rutherford that the atom was MOSTLY EMPTY SPACE. Also, the NUCLEUS WAS DENSE, the NUCLEUS WAS POSITIVELY CHARGED, and the ELECTRONS FLEW FAR FROM THE NUCLEUS (relatively).

72. This is endothermic (table I says $\Delta H = +14.78$ kJ/mole. Heat moves (not cold). Therefore since it gets colder in your hand, heat flows from hand to tube. The black dots = H atoms, they are "more positive" and thereby orient themselves towards the negative chloride anion.

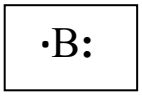


73. a. Ethanol is polar, so if something dissolves in ethanol it's polar too, since like dissolves like. There will be intermolecular attraction between the ethanol and this second substance. That will elevate the BP of the solution, as compared to pure ethanol.

b. One mole of ethanol combustion according to this reaction produces 1367 kJ, so twice the moles makes twice the heat: 1367 x 2.00 = 2734 kJ = 2730 kJ with 2 SF.

c. That it is volatile, which means it evaporates fairly well because of less intermolecular attraction. This means it has a higher vapor pressure than say water, or a lower boiling point (both are verified by a quick check of table H.

74. Every atom with 5 protons is boron. Ground state electron configuration is 2-3, so draw a big B, with three dots: 2 dots together, one alone.



75. Density = mass/volume density = 20 grams of neon/24.4 liters
(it's not 22.4 because they are trying hard to trick you here!)

Density = 0.81967… g/liter = 0.820 g/L with 3 SF

76a. $q = mC\Delta T$ becomes $q = (5.00g)(4.71\ J/g\cdot K)(30.0\ K)$ *(240-210 K = 30.0K)*
$q = 706.5$ Joules = 707 Joules with 3 SF

76b. BC is the phase change from solid to liquid. No change in kinetic energy (no temperature change), since heat is being added, potential energy is increasing.

76c. $q = mH_V$ is the formula. $q = (5.00g)(1370\ J/g)$ $q = 6850$ Joules 3 SF