Answer	Explanation
1. Answer is D.	Anion formation involves electron gain at the outer level.
2. Answer is B.	$M = \dfrac{n}{V}$ and $n = \dfrac{m}{MM}$ leading to $M = \dfrac{m}{MM \times V}$ $\therefore m = M \times V \times MM$ $= 0.0880 \dfrac{g}{mol} \times 0.0600 \text{ L} \times \dfrac{342 \text{ g}}{mol} = 1.81 \text{ g}$
3. Answer is C.	$\Pi = iMRT$. For all other conditions being the same $\Pi \propto i$. The 'i' value for $NaHCO_3$ is 2; for $C_6H_{12}O_6$ is 1; for $CaCl_2$, is 3; and for Na_2SO_4 is 3.
4. Answer is B.	Maximum amount of X that can be dissolved is 53.7 g. (68 g x $\dfrac{79 \text{ g X}}{100 \text{ g H}_2\text{O}}$ = 53.7 g). The undissolved amount of X is 1.3 g (55 g – 53.7 g). This will cause the mixture to be heterogeneous.
5. Answer is E.	It follows the definition.
6. Answer is B.	Methane is the simplest alkane.
7. Answer is E.	Ionization energy is the loss of an electron in gaseous state. Noble gases do not favor loss of electron due to the very stable electron configuration, therefore the energy required to form the ion is highest.
8. Answer is A.	$K_c = \dfrac{k_f}{k_r} = \dfrac{1.4 \times 10^{11}}{2.5 \times 10^{-5}} = 5.6 \times 10^{15}$
9. Answer is B.	It fits the rules of the nomenclature.
10. Answer is C.	rate = $k[PCl_5]^2 = 2^2 = 4$ times value
11. Answer is D.	6 + 8 + 8 = 22
12. Answer is E.	1 mol $Mg(NO_3)_2$ will produce 2 mol NO_3^-. 1 mol $Al(NO_3)_3$ will produce 3 mol NO_3^- and 1 mol $Ca(NO_3)_3$ will produce 2 mol NO_3^-.
13. Answer is B.	Self-explanatory.
14. Answer is A.	0.20 dg x $\dfrac{1 \text{ g}}{10 \text{ dg}}$ x $\dfrac{1000 \text{ mg}}{1 \text{ g}}$ = 20 mg
15. Answer is E.	The only pair that has metal and nonmetal to transfer electrons between one another.
16. Answer is D.	It follows the rules of nomenclature.
17. Answer is A.	The equilibrium expression has been reversed. All others are in the forward direction.
18. Answer is D.	Follows the mathematical equation for a zero-order reaction, $[A]_t = -kt + [A]_o$.
19. Answer is A.	The elemental symbols are Si, S, and Sn respectively.
20. Answer is D.	An element's atomic mass value represent weighted averages of naturally occurring isotopes.

21. Answer is B.	$HNO_3 \longrightarrow H^+ + NO_3^-$ $0.00025\ M\ HNO_3 \times \dfrac{1\ \text{mol hydrogen ion}}{1\ \text{mol nitric acid}} = 0.00025\ M\ H^+$ $pH = -\log[H^+] = -\log(0.00025\ M) = 3.6$
22. Answer is B.	Combustion of a hydrocarbon (C_xH_y) produces water and carbon dioxide.
23. Answer is C.	The working equation (Boyle's Law) is $P_1V_1 = P_2V_2$ $(500\ \text{mL})(0.971\ \text{atm}) = (P_2)(1.50\ \text{atm})$, $P_2 = \dfrac{(500\ \text{mL})(0.971\ \text{atm})}{1.50\ \text{atm}} = 324\ \text{mL}$
24. Answer is A.	The evaporation of water requires energy input.
25. Answer is E.	The answer is self-explanatory.
26. Answer is B.	Percent Na $= \dfrac{\text{molar mass Na x \# atoms in formula}}{\text{molar mass NaOH}} \times 100\ \% = \dfrac{23\ g\frac{Na}{mol}\ x1}{40\ g\ NaOH/mol} \times$ $100 = 57.5\%$
27. Answer is C.	Being a noble gas argon has the least inclination in losing or gaining electron.
28. Answer is B.	X-ray is the only type of radiation with higher energy and, therefore, shorter in wavelength.
29. Answer is E.	Ethene gains bonds to hydrogen in this hydrogenation and the oxidation number of carbon goes from –1 to –3.
30. Answer is A.	Ammonia is pyramidal with three bonded atoms and a nonbonding pair of $H - \ddot{N} - H$ $\quad\ \ |$ $\quad\ \ H$ electrons around the central atom.
31. Answer is C.	Coulomb's Law measures the interactions between charged particles.
32. Answer is C.	$pH = -\log[H^+]$, leading to $[H^+] = 10^{-pH} = 10^{(-8.5)}\ M = 3.16 \times 10^{-9}\ M$.
33. Answer is A.	The general appearance of a combination reaction is $A + B \longrightarrow AB$.
34. Answer is D.	The working equation is $\dfrac{P_1}{T_1} = \dfrac{P_2}{T_2} = \dfrac{1.0}{300} = \dfrac{P_2}{400} = \dfrac{400}{300} = P_2 = 1.33\ \text{atm}$
35. Answer is D.	Simply divide each number of moles by the smallest number of moles to get the relative ratio. $\dfrac{1.67\ \text{moles C}}{1.67\ \text{moles C}} = 1\quad \dfrac{6.68\ \text{moles H}}{1.67\ \text{moles C}} = 4$ This produces atom ratio C:H as 1:4 yielding the empirical formula as CH_4.
36. Answer is C.	Nonmetals share pair of electrons when bonding with another nonmetal.
37. Answer is E.	$1.5\ \text{mol}\ Al_2O_3 \times \dfrac{4\ \text{mol Al}}{2\ \text{mol}\ Al_2O_3} = 3.0\ \text{mol Al}$
38. Answer is C.	At STP the molar volume for a gas is 22.4 L.
39. Answer is A.	Self-explanatory.
40. Answer is D.	$1.500\ \text{mol}\ Fe_2O_3 \times \dfrac{159.69\ g\ Fe_2O_3}{1\ \text{mol}\ Fe_2O_3} = 239.5\ g\ Fe_2O_3$