FIFTY FREQUENTLY FORGOTTEN FUN FACTS

This packet contains topics from each of the units we worked on this year with questions. Most of the questions are similar to what you would expect to see on Part B2 and C of the Regents Exam in Chemistry. The multiple choice questions mirror common questions found on Parts A and B1.

I. ATOMIC STRUCTURE & NUCLEAR CHEMISTRY

1) Protons are +1 each with a mass of 1 amu each, the number of protons = atomic number, nuclear charge = + (# protons). [Periodic Table]

a) How many protons are there in a nucleus of Kr-85 ?______36______ **the atomic number is 36.**

b) What is the nuclear charge of an atom of Br?_____+35______ **there are 35 protons in the nucleus.**

c) What is the mass of the protons in a nucleus of O-15?___8 amu_____ **there are 8 protons, 1 amu each.**

2) Neutrons are neutral with a mass of 1 amu each, # neutrons = mass # - atomic number. Isotopes = atoms of the same element (same atomic #) but different # of neutrons (mass #). [Periodic Table]

a) How many neutrons are there in the nucleus of $^{56}_{26}Fe$?____30_____ **56 nucleons – 26 protons = 30 neutrons**

b) Circle the two nuclei that are isotopes of each other: $^{15}_{8}O$ $^{15}_{7}N$ $^{16}_{8}O$ $^{16}_{9}F$ **same atomic #, different mass**

3) Electrons are each -1 with a mass that is VERY, VERY tiny compared to the mass of a proton or neutron.

a) Which particle has a mass that is 1/1836th the mass of a proton?
1) $^{4}_{2}He$ 2) $^{1}_{1}H$ 3) $^{0}_{-1}e$ 4) $^{1}_{0}n$

4) Natural Decay: Parent Nuclide → Decay particle + daughter nuclide [Tables N and O]

a) Write the decay for U-238: _______$^{238}_{92}U \rightarrow {}^{4}_{2}He + {}^{234}_{90}Th$_________ **when the atomic # changes, the ID of the element changes as well.**

b) Write the decay for K-37:________$^{37}_{19}K \rightarrow {}^{0}_{+1}e + {}^{37}_{18}Ar$ ____________

c) Write the decay for P-32:_______$^{32}_{15}P \rightarrow {}^{0}_{-1}e + {}^{32}_{16}S$ __________

5) <u>Artificial Transmutation</u> is when a relatively stable nucleus is impacted by a particle bullet at high speeds and becomes an unstable nucleus of a different element. <u>Nuclear fission</u> occurs when nuclei of U-235 or Pu-239 are impacted by a neutron and split into two smaller nuclei and more neutrons. <u>Nuclear fusion</u> occurs when two small nuclei of hydrogen combine at high temperatures and pressures to form larger nuclei of helium. Both fission and fusion convert mass into a huge amount of energy.

Given the nuclear reactions:
1) $^{235}_{92}U + {}^{1}_{0}n \rightarrow {}^{92}_{36}Kr + {}^{141}_{56}Ba + 3\ {}^{1}_{0}n$
2) $^{239}_{94}Pu + {}^{4}_{2}He \rightarrow {}^{242}_{96}Cm + {}^{1}_{0}n$
3) $_{91}{}^{234}Pa \rightarrow {}_{-1}{}^{0}e + {}_{92}{}^{234}U$
4) $_{1}{}^{2}H + {}_{1}{}^{2}H \rightarrow {}_{2}{}^{4}He$

a) Which reaction represents natural decay?____3___ **element → decay particle + new element**

b) Which reaction represents artificial transmutation?______2___ **element + bullet → new element + fragments**

c) Which reaction represents nuclear fission?_____1_____ **uranium split in two by a neutron**

d) Which reaction represents nuclear fusion?_____4____ **two atoms → one atom**

6) Weight-average mass = $\frac{\text{(\% of isotope 1 X mass of isotope 1)}}{100}$ + $\frac{\text{(\% of isotope 2 X mass of isotope 2)}}{100}$ + …

a) What is the weight-average mass of an isotope if X-50 (mass = 50.0 amu) has an abundance of 20.0% and X-52 (mass = 52.0 amu) has an abundance of 80.0%? Show all work:

(50.0 amu X 20.0%/100) + (52.0 amu X 80.0%/100) = EITHER use a decimal OR divide by 100.

answer:____________51.6 amu______________

7) # Half-lives = (time elapsed / length of half-life) [Tables N and T]

a) A sample of Co-60 is left to sit for 15.78 years. How many half-lives have gone by?

15.78 years / 5.26 y per HL = **3 HL Round to nearest whole number.**

b) What percent of the original sample remains after this number of half-lives?

100 → 50 → 25 → **12.5% cut 100% in half three times.**

c) If the original mass of the sample was 20.0 grams, how many grams of Co-60 remain?

20.0 → 10.0 → 5.0 → **2.5 g cut 20.0 in half three times.**

II. PHYSICAL BEHAVIOR OF MATTER

8) Heat of Fusion = heat added to MELT or heat removed to FREEZE a substance. $q = m H_f$ [Tables B, T]

a) How many joules are required to melt 10.0 grams of water at the melting point? Show all work:

$q = mH_f$ = 10.0 g X 334 J/g = **3340 J**

9) Heat of Vaporization = heat added to BOIL or removed to CONDENSE a substance. $q = m H_v$ [Tables B, T]

a) How many joules are required to boil 20.0 grams of water at the boiling point? Show all work:

$q = mH_v$ = 20.0 g X 2260 J/g = **45 200 J**

10) Calorimetry: $q = mc\Delta t$ = heat that is added or removed to change the temperature of a substance, but NOT its phase. [Tables B, T]

a) How many joules are required to raise the temperature of 15.0 grams of water from 10.0^{o}C to 25.0^{o}C? Show all work:

$q = mC\Delta T$ = 15.0 g X 4.18 J/g^{o}C X 15.0^{o}C = 940.5 → **941 J**

b) 50.0 grams of water absorb 1000. J of energy. By how much does the temperature increase? Show all work:

$q = mC\Delta T$ $\Delta T = q/mC$ = (1000. J / 50.0 g X 4.18 J/g^{o}C) = 4.7846889 → **4.78 ^{o}C**

11) Gas Laws: Temperature must be in Kelvin, STP is found on Reference Table A. [Tables A, T]

a) 50.0 mL of a gas at STP is heated to 400.0°C and is compressed to 20.0 mL. What is the new pressure of the gas?
Show all work: **+273**

$P_1V_1/T_1 = P_2V_2/T_2$ $P_2 = P_1V_1T_2/V_2T_1$ = (1.00 atm X 50.0 mL X 673.0°C) / (20.0 mL X 273 K) = 6.1630036 → **6.16 atm**

12) Avogadro's Hypothesis -- When ANY two gases are at the same T and P, they will have the same volume and THEREFORE the same number of molecules.

a) Which of the following samples of gas contain the same number of molecules?

Gas	Pressure	Temperature	Volume
A	100 kPa	300. K	50.0 mL
B	100 kPa	300. K	50.0 mL
C	200 kPa	200. K	100.0 mL
D	200 kPa	200. K	50.0 mL

Answer: ___A________ and _____B______

13) Temperature (a measure of the KE) remains constant during a phase change, only PE changes during a phase change (Heat of Fusion or Vaporization).

Given the following data table:

Time (min)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Temp (°C)	70	75	80	80	80	80	89	98	107	116	116	116	116	116	116	136	156	186	206

a) What is the melting point of this substance?______________80°C_______________________

b) What is the boiling point of this substance?______________116°C_______________________

c) Between minute 0 and 2, what is happening to kinetic energy?_KE = temp, so it is **increasing**__

d) Between minute 9 and 14, what is happening to kinetic energy?_KE = temp, so it is **remaining constant**_

e) Between minute 5 and 9, what is happening to potential energy?_KE increasing, so PE **remains constant**_

f) Between minute 2 and 5, what is happening to potential energy?_KE is constant, so PE is **increasing**_

14) Phase changes and dissolving are physical changes.

a) Which of the following changes is physical?

1) Li (s) + NaCl (s) → LiCl (s) + Na (s)

2) Li (s) → Li (l)

3) NaCl (aq) + $AgNO_3$ (aq) → $NaNO_3$ (aq) + AgCl (s)

4) 2 Li (s) + O_2 (g) → Li_2O (s)

III. PERIODIC TABLE AND BONDING

15) Elements Br, I, N, Cl, H, O and F form diatomic molecules through nonpolar covalent bonding when there are no other elements present.

a) Complete the following reaction: 2 Na + 2 HOH $\rightarrow$ 2 NaOH + ___H_2___

b) Complete the following reaction: 2 $FeCl_3$ $\rightarrow$ 2 Fe + 3 ___Cl_2____

16) Noble gases are nonreactive, forming monatomic molecules. [Periodic Table]

a) Name an element that exists as monatomic molecules:_name of any noble gas_

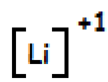
17) When metal atoms form ions, they lose all their valence electrons, and their dot diagrams are the metal symbol, in brackets, with no dots and the + charge on the upper right, outside the brackets. [P.T.]

a) What is the electron configuration of a K^{+1} ion? _2-8-8-1, lose 1 e- t make +1 = **2-8-8**__

b) A Ca^{+2} ion has the same electron configuration as which noble gas?____________Ar_______

c) When Fe forms a +2 ion, its radius _**decreases** as it loses a PEL_

d) Draw the dot diagram for the Li^{+1} ion:



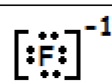
18) When nonmetal atoms form ions, they gain enough electrons to have a stable octet (8 valence electrons), and their dot diagrams are the nonmetal symbol, in brackets, with 8 dots and the - charge on the upper right, outside the brackets. [Periodic Table]

a) What is the electron configuration of a Cl^{-1} ion? __2-8-7 + 1 e- to make it -1 = **2-8-8**__________

b) A S^{-2} ion has the same electron configuration as which noble gas?_________Ar__________

c) When O forms a -2 ion, its radius _increases, as the extra electrons repel each other_

d) Draw the dot diagram for the F^{-1} ion:



19) Hydrogen bonds are strongest between molecules with the greatest electronegativity difference. [Table S]

a) Which molecule has the strongest hydrogen bond attractions? *1) HF* *2) HBr* *3) HCl* *4) H_2O*

20) Ionic character increases as electronegativity difference increases. [Table S]

a) Which compound has the greatest ionic character? *a) NaBr* *2) NaI* *3) NaCl* *d) NaF*

21) At STP, the liquids on the Periodic Table are Br and Hg. The gases are N, Cl, H, O, F and the Noble Gases. All other elements are solids. [Periodic Table]

a) Which element on the Periodic Table is a nonmetallic liquid at STP?___bromine (Br)___

b) Which element at STP is a liquid that conducts electricity well?______Mercury (Hg)___________

c) Name an element that exists in a crystal lattice at STP:_name of any solid, **carbon** or **iron**, for example__

d) Name an element that has no definite volume or shape at STP:_name of any gas, **fluorine** or **argon**, for example_

22) Electronegativity is an atom's attraction to electrons in a chemical bond. [Table S]

a) Which element, when bonded with O, will form the partially negative end of a polar covalent bond?____**F**____

b) Which element has the greatest attraction to electrons when bonded to Na?
1) N *2) O* *3) S* *4) Al*

c) In the molecule CH_3Cl, which element represents the partially negative end of the molecule?
1) C *2) H* *3) Cl* *4) none, it's a nonpolar molecule*

23) Ionization energy is the energy required to remove the most loosely held valence electron from an atom in the gas phase. [Table S]

a) Four elements are heated at the same rate. Which will lose an electron first?
1) Na *2) Br* *3) Fe* *4) Ca*

24) Polyatomic ions form ionic bonds with other ions, but are themselves held together by covalent bonds. [Table E]

a) Which of the following compounds contains both ionic and covalent bonds?
1) NaCl *b) CH_4* *c) $CaCO_3$* *d) CO_2*

IV. COMPOUNDS

25) Ionic compounds are made of a metal and nonmetal, or a metal and a negative polyatomic ion. They have high melting points, and conduct electricity when dissolved in water (electrolytes) or melted. [P. T.]

a) Which of the following substances is the best conductor of electricity when dissolved in water?
1) K_2SO_4 b) CCl_4 c) $C_6H_{12}O_6$ d) NO_2

26) Molecular compounds tend to be soft, have low melting points and high vapor pressures. Hydrogen bonds are the strongest of the intermolecular forces (when the H of one polar molecule attracts the N, O or F of another polar molecule), followed by dipole (where the more electronegative end of one polar molecule attracts the less electronegative end of another polar molecule) and London Dispersion forces are the weakest, where motion of electrons through the molecule causes temporary poles to form. Molecular substances (with the exception of acids) are poor conductors of electricity (nonelectrolytes). [P. T.]

a) Which of the following substances is the poorest conductor of electricity when dissolved in water?
1) $CaCl_2$ *b) HCl* *c) NO_2* *d) NaBr*

b) Which of the following molecules is subject to hydrogen bond attractions in the solid and liquid phase?
a) CH_4 *b) NH_3* *c) CO_2* *d) C_3H_8*

27) Network solids are substances that do not have distinct molecules or ions that can separate with heating. To melt a network solid, covalent bonds have to be broken. This takes tremendous energy, meaning that network solids have extremely high melting points. They are insoluble in water, and are poor conductors of electricity. Examples of network solids are diamond (C), sapphire, ruby, corundum (Al_2O_3) and quartz (SiO_2).

a) Which of the following is a network solid?

1) NaCl *b) H_2O* *c) SiO_2* *d) Hg*

28) ONLY metals with more than one listed charge need a Roman numeral after their name (Stock system) when naming an ionic compound. Nonmetals with more than one oxidation state will also need a Roman numeral in their name if they are the less electronegative atom in a molecular compound. [P. T., Table E]

a) Name the compound $Cu(NO_3)_2$:__copper (II) nitrate___

b) Write the formula for iron (III) sulfite:_____Fe^{+3} and SO_3^{-2} → **$Fe_2(SO_3)_3$**______________________

c) Name the compound NO_2, using the Stock system:_________nitrogen (IV) oxide___________

d) Write the formula for phosphorous (IV) oxide:_____P^{+4} + O^{-2} → **P_2O_4**_molecules can have molecular formulas!

29) Formula Mass = sum of all atomic masses in the compound, rounded to the tenths place, with the units g/mole. [Periodic Table]

a) Determine the formula mass of $Cu(NO_3)_2$:__63.5 + (2 X 14.0) + (6 X 16.0) = **187.5 g/mole**___

30) grams / formula mass = moles moles X formula mass = grams [Periodic Table, Table T]

a) Using the formula mass of $Cu(NO_3)_2$, how many moles are there in 100.0 grams of $Cu(NO_3)_2$ (show all work):

moles = given mass / gram formula mass = 100.0 g / 187.5 g/mole = 0.53333333333 → **0.5333 grams**

b) Using the formula mass of $Cu(NO_3)_2$, how many grams are there in 2.5 moles of $Cu(NO_3)_2$ (show all work):

grams = moles X gram formula mass = 2.5 moles X 187.5 g/mole = 468.75 → **470 grams**

31) Molecular Formula = (Molecular Mass / Empirical Mass) X Empirical Formula [Periodic Table]

a) Quantitative analysis determines that a compound has an empirical formula of CH and a molecular mass of 26 grams/mole. Determine the molecular formula of this compound, showing all work:

(Molecular Mass / Empirical Mass) X Empirical Formula = (26 g / 13.0 g) = 2 X CH = **C_2H_2**

32) % Of Water In A Hydrate = (mass of water / mass of hydrate) X 100 [Periodic Table, Tabe T]

a) What is the % by mass of H_2O in $CaCl_2 \cdot 2\ H_2O$? Show all work:

FM of $CaCl_2$ = 40.1 + (2 X 35.5) = 111.1 g/mole FM of 2 H_2O = 2 X 18.0 = 36.0 g/mole

FM of $CaCl_2 \cdot 2\ H_2O$ = 111.1 + 36.0 = 147.1 g/mole

(mass of water / mass of hydrate) X 100 = (36.0 g / 147.1 g) X 100 = 24.47314 → **24.5%**

b) 2.00 grams of hydrate are heated to a constant mass of 1.20 grams. What was the % by mass of water in the hydrate? Show all work:

mass of water = mass of hydrate – mass of anhydride = 2.00 g – 1.20 g = 0.80 g of water in the hydrate

(mass of water / mass of hydrate) X 100 = (0.80 g / 2.00 g) X 100 = **40.% water in the hydrate**

V. REACTIONS

33) Synthesis, Decomposition, and Single Replacement reactions are all examples of REDOX reactions, because one species is oxidized and another is reduced. Double replacement (including neutralization) reactions are NOT redox reactions.

a) Which of the following reactions is an example of a redox reaction?

1) NaCl (s) → Na^{+1} (aq) + Cl^{-1} (aq)

2) 2 K (s) + $CaSO_4$ (aq) → K_2SO_4 (aq) + Ca (s)

3) $Ca(NO_3)_2$ (aq) + K_2CO_3 (aq) → $CaCO_3$ (s) + 2 KNO_3 (aq)

4) H_2O (l) → H_2O (g)

34) The driving force behind double replacement reactions is the formation of an insoluble precipitate as one of the products. [Table F]

a) Is $PbCl_2$ soluble or insoluble? Explain, based on Table F:

Cl^{-1} is listed on the soluble side of Table F, however Pb^{+2} is an exception to that rule, so $PbCl_2$ is **insoluble** in water.

b) In the reaction $Li_2SO_4 + Ba(NO_3)_2$ → $BaSO_4$ + 2 $LiNO_3$, write the formula for the precipitate:_$\boxed{BaSO_4}$__

35) Stoichiometry: moles of given X (coeff. of target / coeff. of given) = moles of target

a) For the reaction CH_4 + 2 O_2 → CO_2 + 2 H_2O, how many moles of H_2O are formed when 20.0 moles of CH_4 are burned? Show all work.

20.0 moles of CH_4 X (2 H_2O / 1 CH_4) = **40.0 moles of H_2O**

VI. KINETICS & EQUILIBRIUM

36) Energy is absorbed to break chemical bonds and released when new bonds are formed.

a) Which statement best describes the reaction H + H → H_2 + energy:

1) A bond is being broken, which absorbs energy *2) A bond is being formed, which absorbs energy*

3) A bond is being broken, which releases energy *4) A bond is being formed, which releases energy*

37) Activation energy is the energy given to the reactants to get the reaction started.

If the heat of reactants are 45 KJ, the heat of the products are 35 KJ and the heat of the activated complex is 95 KJ,

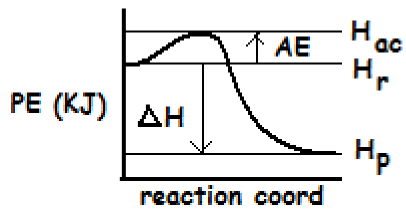
a) What is the activation energy of this reaction?__AE = H_{AC} – H_R = 95 kJ = 45 kJ = **50. kJ**__

b) Adding a catalyst will ___decrease_____ the activation energy by ___removing____ steps from the reaction pathway (mechanism).

c) Adding an inhibitor will _______increase________ the activation energy by ___adding____ steps to the reaction pathway.

d) The heat of reaction (ΔH) of this reaction is____ΔH = H_P – H_R = 35 kJ – 45 kJ = **-10. kJ**___

e) Sketch and label a PE diagram for this reaction:



38) At equilibrium, the RATES are equal. The amounts don't have to be.

a) For the change H_2O (l) + heat ⇔ H_2O (g) at 100ºC, what must be true about the rate of boiling and the rate of condensing?

At equilibrium, the rates of the opposing changes are **EQUAL.**

39) In Le Chatelier's Principle, if a system is at equilibrium, if something is added, then the equilibrium will shift away from the side it is on. If something is removed, then the equilibrium will shift towards that side. After the shift, whatever is being shifted towards will increase in concentration, and whatever is being shifted away from will decrease in concentration.

For the equilibrium N_2 (g) + $3H_2$ (g) ⇔ 2 NH_3 (g) + heat:

a) If N_2 is added, which way will the equilibrium shift?_**forward**, shift AWAY from N_2_

b) If temperature is decreased, which way will the equilibrium shift?_**forward**, shift TOWARD heat_

c) If pressure is increased, which way will the equilibrium shift?_**forward**, toward the side with LESS moles of gas_

d) If H_2 is removed, what will happen to the concentration of NH_3?_shift towards H_2, so NH_3 **decreases** _

e) If NH_3 is added, what will happen to the concentration of N_2?_shift away from NH_3, so N_2 **increases**_

VII. SOLUTIONS

40) Solubility is a measure of how many grams of solute are required to saturate a given amount of solute at a given temperature. [Table G]

a) How many grams of NH_4Cl are required to saturate a 100-gram sample of water at 30°C?__ $\boxed{\text{42 g}}$ __

b) What is the solubility of KNO_3 in 50.0 grams of water at 60°C? _ $\boxed{\text{108 grams can dissolve in 100g, so 108/2 = \textbf{56 g}}}$ _

41) Molarity = moles / L, if grams are given, convert to moles, if mL are given, convert to L. [Table T]

a) What is the molarity of a solution of NaOH (formula mass = 40.0 g/mole) if it contains 20.0 grams of NaOH dissolved into 400.0 mL of solution? Show all work:

moles of NaOH = 20.0 g / 40.0 g/mole = 0.500 moles L = mL / 1000 ml/L = 400.0 mL / 1000 mL/L = 0.4000 L M = moles/L = 0.500 moles / 0.4000 L = **1.250 M**

42) moles = Molarity X L. If asked for grams, convert moles to grams at the end. [Table T]

a) How many grams of NaOH (formula mass = 40.0 g/mole) are needed to make 500.0 mL of a 0.200 M solution of NaOH? Show all work:

L = mL / 1000 ml/L = 500.0 mL / 1000 mL/L = 0.5000 L Moles = M X L = 0.200 M X 0.5000 L = 0.100 moles g of NaOH = 0.100 moles X 40.0 g/mole = **4.00 grams**

43) When a solute is dissolved in water, the boiling point of the solution increases and the freezing point of the solution decreases as the concentration increases. The more ions the solute creates upon dissolving the greater the increase in boiling point/decrease in freezing point. Electrolytes (ionic compounds and acids) put ions into solutions, nonelectrolytes (molecular substances) don't.

a) Which solution of NaCl (aq) has the highest boiling point? *1) 1.0 M* *2) 2.0 M* *3) 3.0 M* $\boxed{\textit{4) 4.0 M}}$

b) Which 1.0 M solution has the lowest freezing point? *1) NaCl* *2)* CH_4 *3)* $CaCO_3$ $\boxed{\textit{4) } MgCl_2}$

III. ACIDS AND BASES

44) Use $M_aV_a = M_bV_b$ ONLY for titration problems, where they give information on BOTH the acid and base. If it is not a titration problem, and they ask for the molarity, use Molarity = moles / L. [Table T]

a) 50.0 mL of 3.0 M HCl are required to neutralize 30.0 mL of an NaOH solution. What is the molarity of the NaOH? Show all work:

$\#H(M_AV_A) = \#OH(M_BV_B)$ $M_B = \#H(M_AV_A) / \#OH(V_B)$ = (1 X 3.0 M X 50.0 mL) / (1 X 30.0 mL) = **5.0 M**

b) A solution of NaOH contains 2.0 moles dissolved into 4.0 L of solution. What is the molarity of the NaOH solution? Show all work:

M = moles / L = 2.0 moles / 4.0 L = **0.50 M**

45) Bronsted/Lowry Acids are proton donors (give off H^+) and B/L Bases are proton acceptors (pick up H^+).

a) In the reaction $NH_3 + HCl \Leftrightarrow NH_4^+ + Cl^-$, the B/L acid in the forward reaction is:_**HCl** loses an H to form Cl^-_

b) In the reaction $HCl + H_2O \Leftrightarrow H_3O^+ + Cl^-$, the B/L base in the reverse reaction is:_**Cl^-** gains an H to form HCl_

IX. ELECTROCHEMISTRY

46) ALL species identified in a redox reaction MUST have their charges written. Be sure to indicate whether the charge is positive (+) or negative (-), as well as the numeric value of the charge. [P. T., Table E]

0 +1 -1 +1 -1 0

a) For the reaction $2\ Na + 2\ HCl \rightarrow 2\ NaCl + H_2$:

Write the charges of each species above their symbols in the above reaction

Oxidation half-reaction:_$Na^0 \rightarrow Na^{+1} + e^-$_

Reduction half-reaction:_$2\ H^{+1} + 2e^- \rightarrow H_2^0$_

Oxidizing Agent:_H^{+1}__ Reducing Agent:_____Na^0___

Spectator Ion:______Cl^{-1}_______

b) What is the negative ion found in a solution of nitric acid?_nitr*ic* comes from nitr*ate* which is **NO_3^{-1}**_

47) The sum of all the charges of each element in a compound is zero. Oxygen is always -2 (unless it is part of the peroxide ion, O_2^{-2}, in which case O is -1). Any element by itself has a charge of 0. [P. T., Table E]

a) What is the charge of Cl in $CaCl_2$?_Ca is +2, so Cl must total -2, divided by the 2 Cl's = **-1**_

b) What is the charge of Cl in Cl_2?_Cl is by itself, so it has **no charge**_

c) What is the charge of Cl in $Ca(ClO_2)_2$?_Ca is +2. O –s (-2 X 4 = -8). Cl must be +6 total, divided by the 2 Cl's = **+3**_

48) Voltaic cells produce electricity using a spontaneous redox reaction, electrolytic cells use electricity to decompose compounds containing Group 1, 2 or 17 elements. [Table J, P. T.]

a) A voltaic cell has Al and Au as its metal electrodes. Which metal acts as the anode?_**Al**, because it is more active_

b) A voltaic cell has Fe and Sn as its metal electrodes. From which metal to which metal will electrons flow?

From _**Fe**, which is more active_ to _**Sn**, which is less active_.

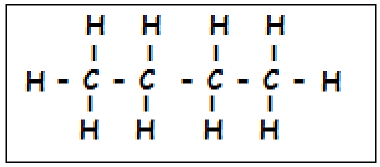
c) Name a metal that can be formed by electrolytic reduction._NAME of any group 1 or 2 metal, **lithium**, for example_

d) Name a nonmetal that can be formed by electrolytic oxidation._NAME of any group 17 NM, **fluorine**, for example_

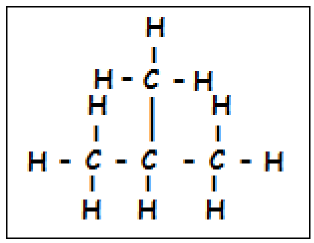
X. ORGANIC CHEMISTRY

49) Isomers are organic compounds with the same molecular formula, but with a different structural formula. [Tables P, Q and R]

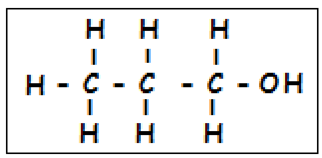
a) Draw the structural formula of butane:



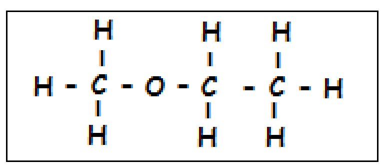
b) Draw the structural formula of an isomer of butane:



c) Draw the structural formula of 1-propanol:



d) Draw the structural formula of an ether that is an isomer of 1-propanol:



50) Addition reactions involve alkenes or alkynes. Substitution reactions involve alkanes. Use Reference Table Q to determine which type of hydrocarbon you have. [Table Q]

a) Which of the following molecules can undergo a substitution reaction?

1) $\boxed{C_3H_8}$ *2) C_4H_8* *$\boxed{3)\ C_5H_{12}}$* *$\boxed{4)\ CH_4}$*

HA! It's a trick question. 1, 3 and 5 are all SATURATED,so they have to undergo substitution. 2 has a double bond, so it undergoes addition. Sorry! ☺

