

① convert 200mg $\rightarrow$ g

④ $200\text{mg} \times \frac{1\text{g}}{10^3\text{mg}} = 0.200\text{g}$

$$(X_g \text{ of AgCl})(0.7527) = 0.200\text{g}$$

$$(X_g \text{ of AgCl}) = 0.200\text{g} (0.7527)$$

$$\boxed{X_g \text{ of AgCl} = 0.266\text{g}}$$

② sodium bicarbonate



find total mass:



$$(22.99\text{g/mol}) + (1.008\text{g/mol}) + (12.01\text{g/mol}) + 3(16.00\text{g/mol}) = 84.01\text{g/mol}$$

$$\begin{aligned} \% \text{ mass of O} &= \frac{\text{mass of O in compound}}{\text{total mass of compound}} \times 100 = \\ &= \frac{48\text{g/mol}}{84.01\text{g/mol}} \times 100 = \boxed{57.14\%} \end{aligned}$$

③ Use mass of CO_2 and H_2O to find how many grams of C and H

⑤ were in the unknown compound sample to find O. (We can't easily tell O from CO_2 and H_2O because combustion involves reacting with O_2 which could end up in our products)

$$26.76\text{g H}_2\text{O} \times \frac{1\text{mol H}_2\text{O}}{18\text{g H}_2\text{O}} \times \frac{2\text{mol H}}{1\text{mol H}_2\text{O}} = \frac{2.9733\text{mol H}}{1\text{mol H}} \times \frac{1\text{g H}}{1\text{mol H}} = 2.9733\text{g}$$

$$196.26\text{g CO}_2 \times \frac{1\text{mol CO}_2}{44.01\text{g CO}_2} \times \frac{1\text{mol C}}{1\text{mol CO}_2} = \frac{4.459441036\text{mol C}}{1\text{mol C}} \times \frac{12.01\text{g C}}{1\text{mol C}} = 53.56\text{g}$$

68.42

$$\text{sample} = (\text{mass H} + \text{mass C} + \text{mass O})$$

$$68.42\text{g} - 2.9733\text{g H} - 53.56\text{g C} = X\text{g O} \rightarrow 11.89\text{g O in sample}$$

now find moles of C, H, O and divide by the smallest of the 3.

$$\text{H: } 2.9733\text{mol} / 0.743245612\text{mol} \approx 4$$

$$\text{C: } 4.459441036\text{mol} / 0.743245612\text{mol} \approx 6$$

$$\text{O: } 11.89\text{g} \times \frac{1\text{mol O}}{16\text{g O}} = 0.743245612\text{mol} / 0.743245612\text{mol} = 1$$

empirical formula: $\text{C}_6\text{H}_4\text{O}$ to get molecular formula, divide the

known molar mass by the empirical formula's molar mass to get the factor

$$\frac{184.12\text{g/mol}}{92.06\text{g/mol}} = 2 \quad \text{so double the subscripts to get } \boxed{\text{C}_{12}\text{H}_8\text{O}_2}$$

so there's 12 carbons

(4) ① $5.2g Al \times \frac{1 \text{ mol Al}}{26.98g Al} \times \frac{3 \text{ mol H}_2}{2 \text{ mol Al}} = 0.2891 \text{ mol H}_2$

$6.1g NaOH \times \frac{1 \text{ mol NaOH}}{39.99g NaOH} \times \frac{3 \text{ mol H}_2}{2 \text{ mol NaOH}} = 0.22881 \text{ mol H}_2$

less H₂ produced
so NaOH was the limiting reactant

$0.22881 \text{ mol H}_2 \times \frac{2g H_2}{1 \text{ mol H}_2} = 0.4576g H_2$

% yield = $\frac{\text{g collected (actual)}}{\text{theoretical yield}} \times 100$
 $= 0.35g / 0.4576g \times 100 = \boxed{76.6\%}$

(5) chlorous acid: HClO₂ ^{68.45g/mol} -ous → -ite
 ③ → chlorite ion ClO₂⁻ -ic → -ate

$40.3g HClO_2 \times \frac{1 \text{ mol HClO}_2}{68.45g HClO_2} \times \frac{2 \text{ mol O}}{1 \text{ mol HClO}_2} \times \frac{6.022 \times 10^{23} \text{ atoms of O}}{1 \text{ mol O}}$
 $= \boxed{7.09 \times 10^{23} \text{ atoms of O}}$

(6) (1) combination involves taking two or more elements/compounds and forming a single substance, in this case H₂O.

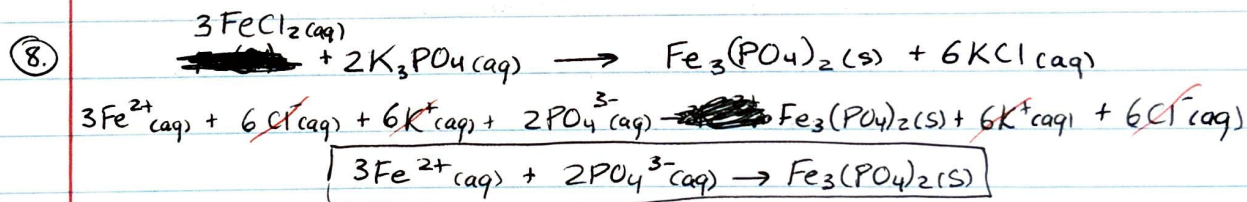
(2) combustion always involves reacting an organic substance with O₂ to yield H₂O and CO₂. Also if there's ever a reactant or product that's by itself (like just a metal solid like Na(s) or a diatomic like O₂(g)) it's always gonna be a redox!

(3) It's a combination rxn but a true ppt. reaction must form an insoluble salt; MgCl₂(s) is actually soluble when you look at your solubility rules so nothing will precipitate

(4) Brønsted-Lowry Acid Base reactions simply involve transferring hydrogens from one reactant (acid) to the other (base)
 so HCl is the acid, NH₃ is the base

(5) This is both, since $\text{CaSO}_4(\text{s})$ is actually insoluble, this counts as a ppt. rxn.

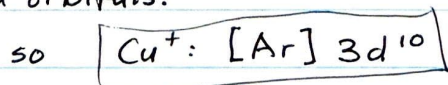
- (7) (1) ~~the~~ The prefixes like di- or mono- or tri- aren't used for ionic compounds like $\text{Ni}(\text{OH})_2$, only for covalent compounds
↳ should be nickel(II) hydroxide
- (2) Ca is not a transition metal so it never needs a (II) indication
↳ should be calcium carbonate
- (3) Though it is covalent, if the first atom is just one, you don't need to put "mono-" in front of it.
↳ should be carbon monoxide
- (4) remember your polyatomics! -ous endings are for polyatomic ions that end in -ite. ClO_4^- is perchlorate so
↳ HClO_4 should be perchloric acid
- (5) Correct! anions like S^{2-} , Cl^- , F^- , Br^- , I^- , or O^{2-} don't need ~~the~~ any prefixes when in ionic compounds.



(9) Ground-State of Cu^+ $[\text{Ar}] 4s^1 3d^{10}$

* for Cr, Mo, Cu, and Ag, their configurations take 1 s electron, and puts it in the d orbital.

Cu^+ loses 1 electron, remember when you remove electrons from transition metals, you remove from the s orbitals before the d orbitals.



⑩ The neutral atom that fits the configuration is $\boxed{\text{Ar}}$ since its in the 3p orbital and has 6 electrons in it. So that's why it fits with the $3p^6$ description.

The cation with a single charge means its missing one electron. So $\boxed{\text{Na}^+}$ would also share the same configuration since its 4s' electron is removed and then it's only left with electrons in the 3p orbital like Ar.

The anion with a single charge means it has gained an electron and so $\boxed{\text{Cl}^-}$ would also fit since it goes from $3p^5$ to $3p^6$ like Ar when it gains an electron.

⑪ IE increases $\rightarrow$ and $\uparrow$ so each option looks ~~like it won't work~~ like it won't work, except O has a lower IE than N since it doesn't follow the trend. B, Al, O, S all have lower IE's than the element before it.

12. % m/m is $\frac{\text{mass of solute}}{\text{mass of solution}} \times 100$

3 Molarity is $\frac{\text{moles of solute}}{\text{volume of solution (in L)}}$

so just convert % into grams 47% → 47g

47% m/m isopropanol in acetone

↓

$\frac{47\text{g iso.}}{47\text{g iso.} + 53\text{g acetone}}$ } remember is mass of solution
 also we know acetone because $47 + 53 = 100\%$
 (needs to add to 100)

to get this into M,

1) we need to turn the top into moles then

2) turn the g of solution into L of solution.

3 divide

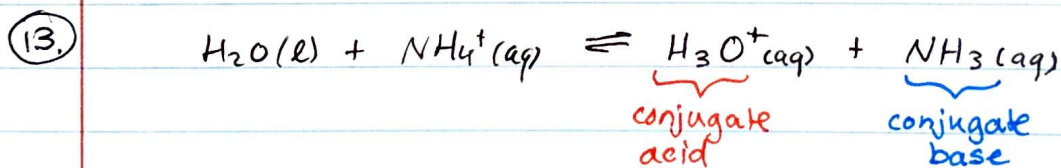
1) $47\text{g iso.} \times \frac{1\text{mol iso.}}{60.1\text{g iso.}} = 0.7821\text{mol isopropanol}$

2) use densities to find volumes

$47\text{g iso.} \times \frac{1\text{mL}}{0.785\text{g iso.}} \times \frac{1\text{L}}{1000\text{mL}} = 0.05987\text{L iso.}$

$53\text{g acetone} \times \frac{1\text{mL}}{0.791\text{g acetone}} \times \frac{1\text{L}}{1000\text{mL}} = 0.067\text{L acetone}$

3) $\frac{0.7821\text{mol iso.}}{(0.05987\text{L iso.} + 0.067\text{L acetone})} = \boxed{6.16\text{M}}$



14. molar mass of lactic acid

5 $(3 \times 12.01\text{g} + 3 \times 16.00\text{g} + 6 \times 1.008\text{g}) = 90.08\text{g/mol}$

$42\text{g} \times \frac{1\text{mol}}{90.08\text{g}} \times \frac{6.022 \times 10^{23}\text{ molecules of lactic acid}}{1\text{mol}} = \boxed{2.81 \times 10^{23}\text{ molecules}}$

15.



2

$$27\text{g propane} \times \frac{1\text{mol propane}}{44.09\text{g propane}} \times \frac{4\text{mol H}_2\text{O}}{1\text{mol propane}} = 2.45\text{mol H}_2\text{O}$$

$$1.3\text{ moles O}_2 \times \frac{4\text{mol H}_2\text{O}}{5\text{mol O}_2} = 1.04\text{mol H}_2\text{O} \quad \swarrow \text{O}_2 \text{ is limiting}$$

$$1.04\text{mol H}_2\text{O} \times \frac{18\text{g H}_2\text{O}}{1\text{mol H}_2\text{O}} = 18.72\text{g H}_2\text{O}$$

$$\% \text{ yield} = \frac{14.2\text{g}}{18.72\text{g}} \times 100 = \boxed{75.85\%}$$

16.

$$M_1 V_1 = M_2 V_2$$

$$1) (5.0\text{M})(30\text{mL}) = (0.150\text{M})(V_2)$$

$$V_2 = \boxed{1,000\text{ml or 1L}}$$

$$2) (0.150\text{M})(10\text{mL}) = (M_2)(100\text{mL})$$

$$\boxed{M_2 = 0.015\text{M}}$$