

Key!

Exam 2 Test Prep

Give examples of homogenous mixtures.

- Saltwater

- vinegar

- tea

- coffee

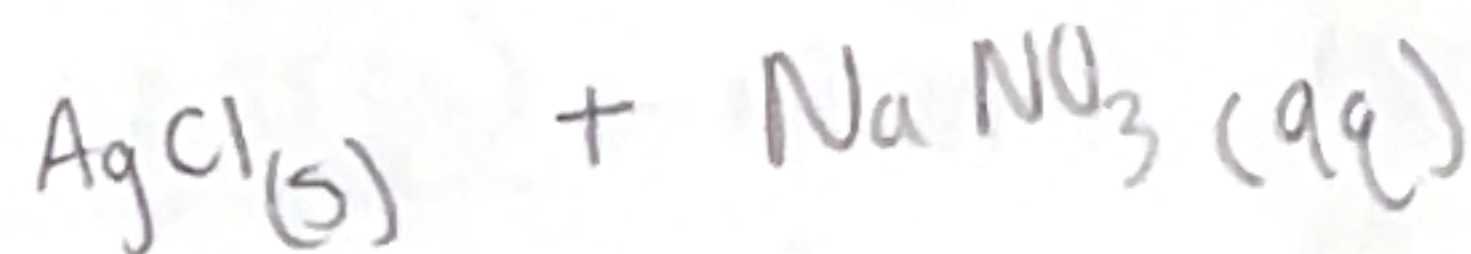
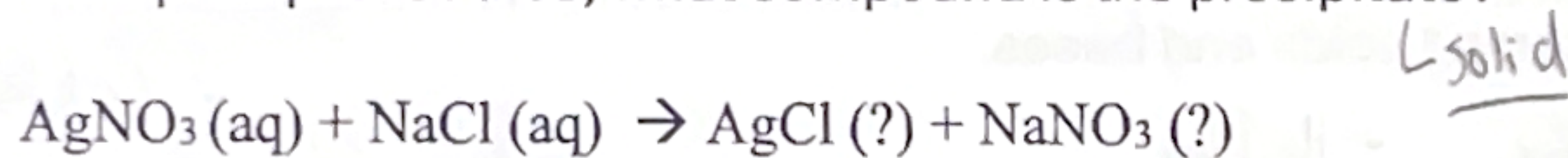
- Air

If sugar is mixed with tea, what is the solvent, and what is the solute?

Solvent → substance that does dissolving → (tea)
(substance present in larger amount)

Solute → substance that gets dissolved → (sugar)
(substance present in smaller amount)

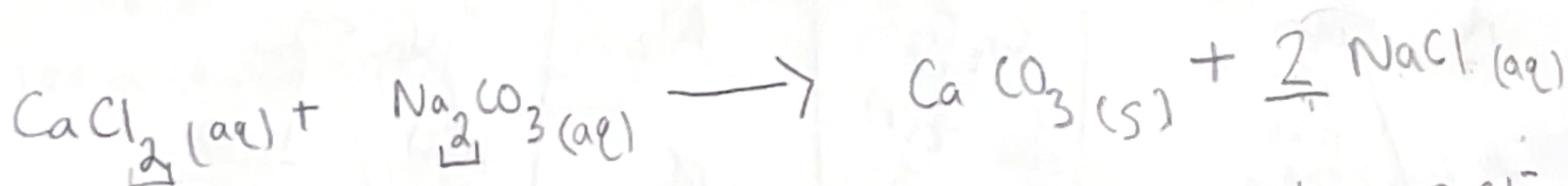
Does this equation yield a precipitate? If so, what compound is the precipitate?



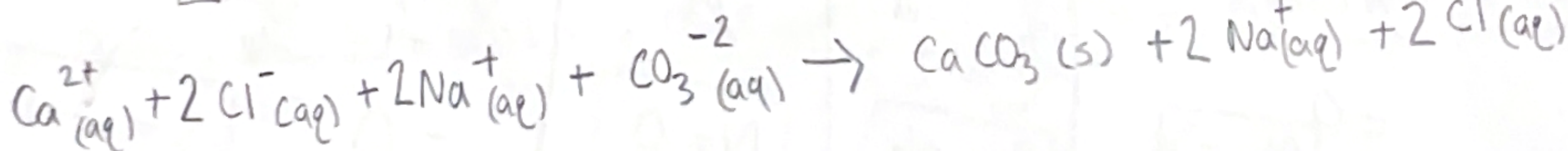
Yes, AgCl is the precipitate.

Write the molecular equation, complete ionic equation, and net ionic equation for the precipitation reaction that occurs when aqueous solutions of calcium chloride and sodium carbonate are mixed.

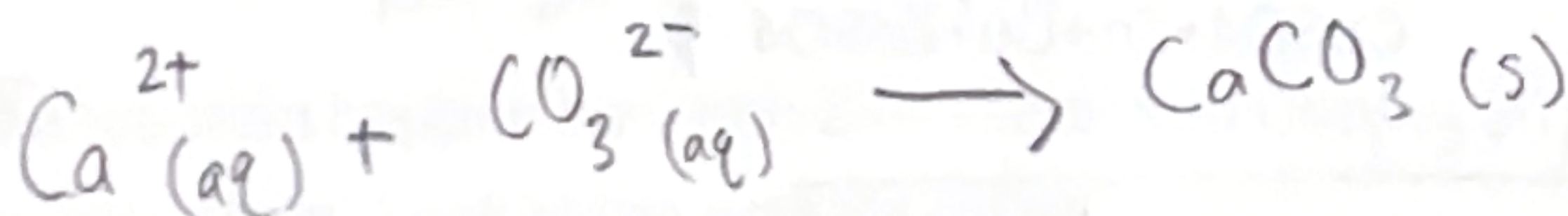
Molecular equation:



Complete ionic equation:

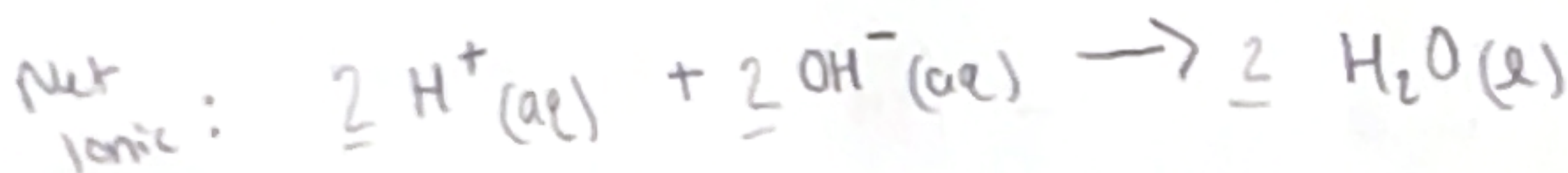
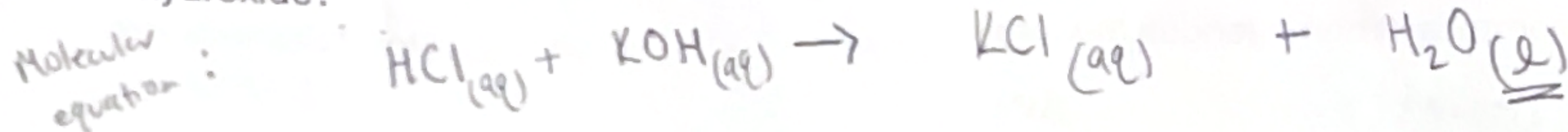


Net ionic:



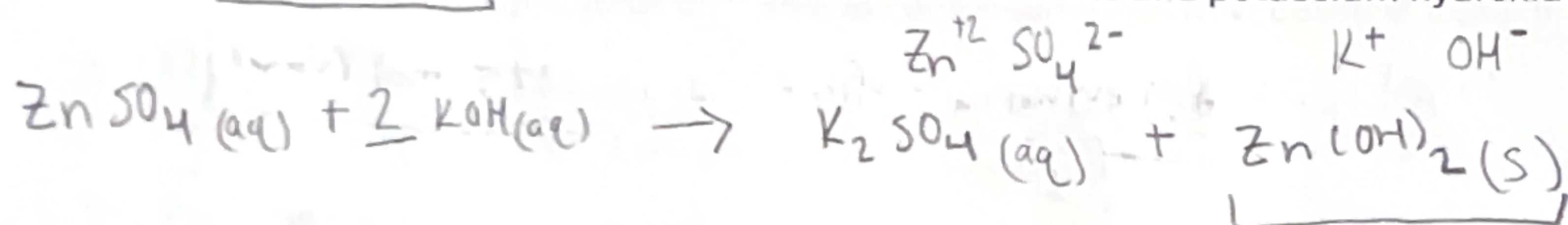
Spectator ions: $\text{Cl}^{-} + \text{Na}^{+}$

What is the net ionic equation for the reaction between hydrochloric acid and potassium hydroxide?

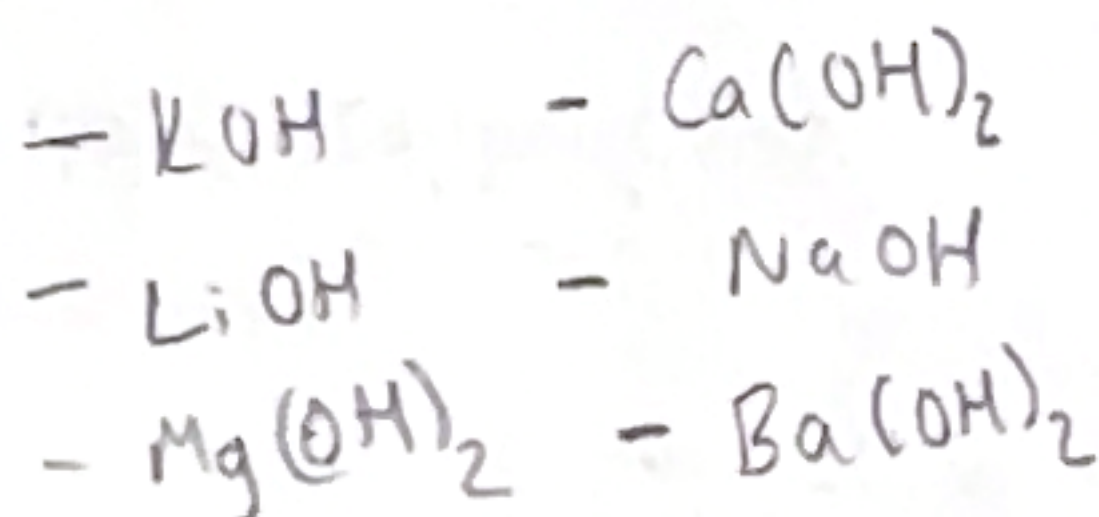
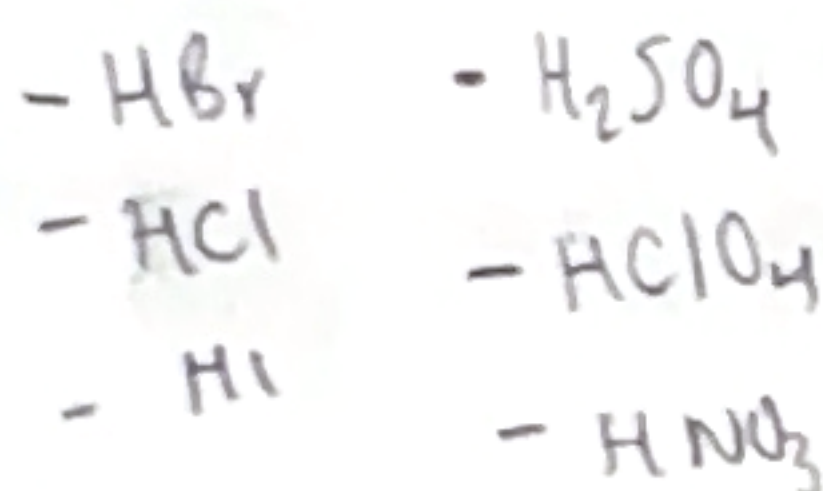


* If there's a coefficient of 2 divide everything by 2 to get to empirical formula.

What are the spectator ions in the reaction between zinc sulfate and potassium hydroxide?



List 3 strong acids and bases.

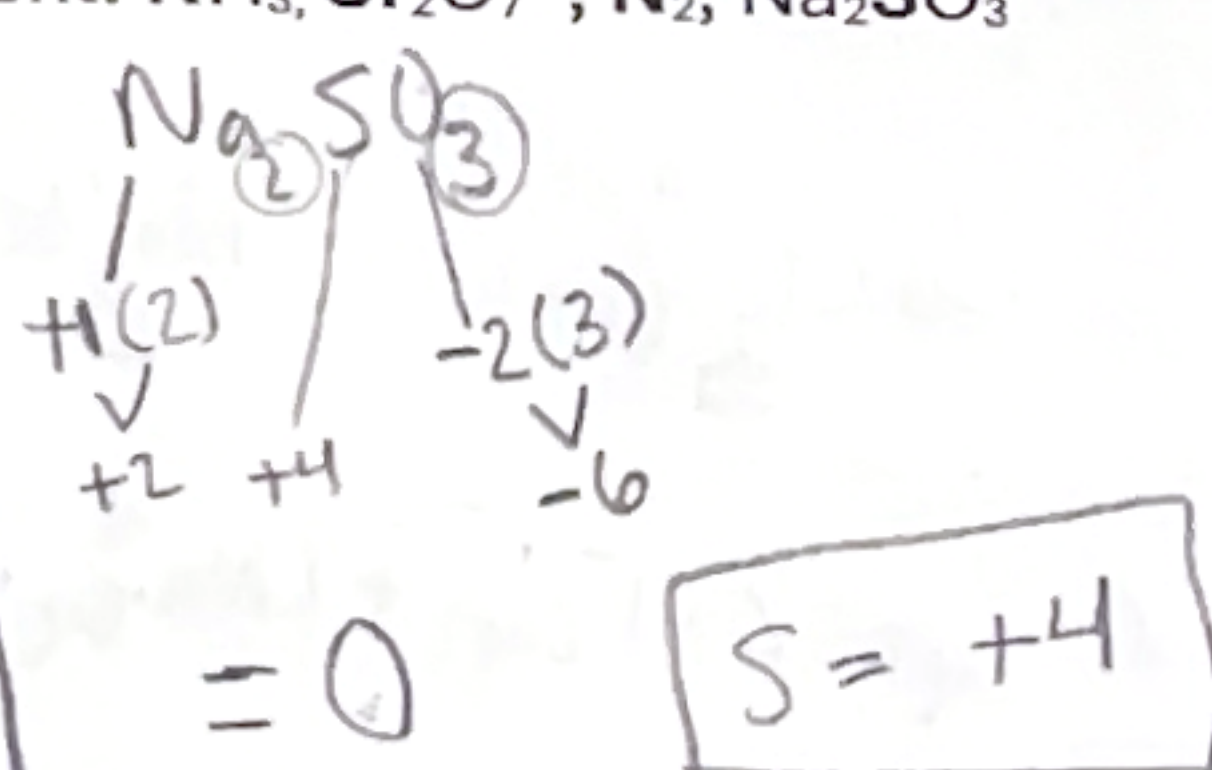
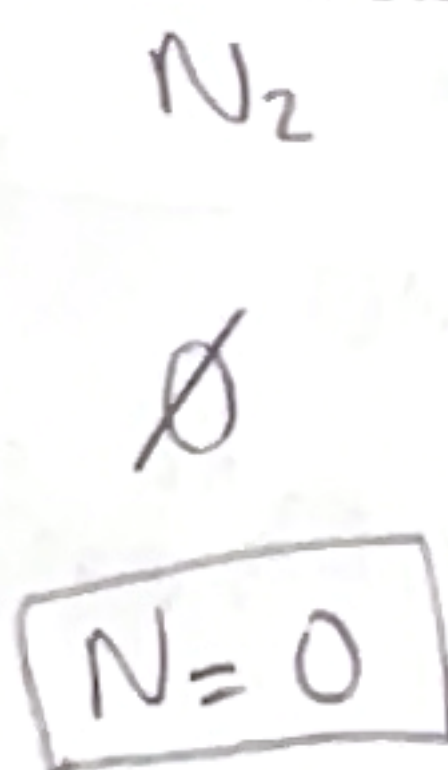
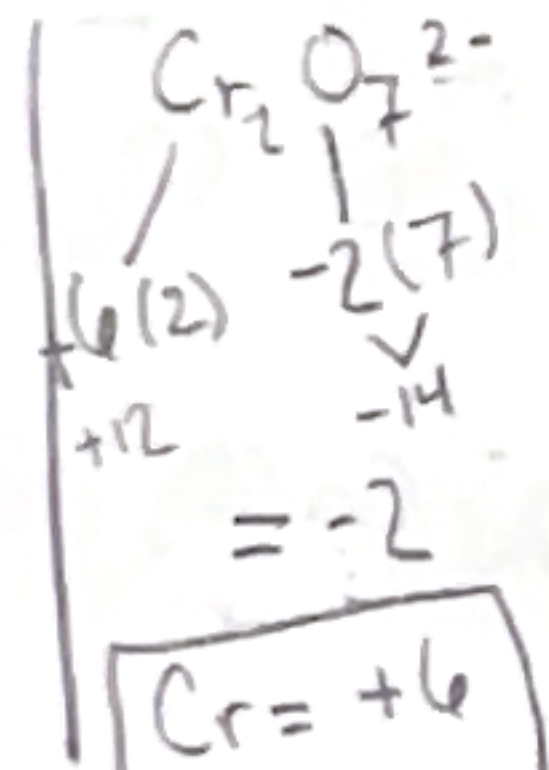
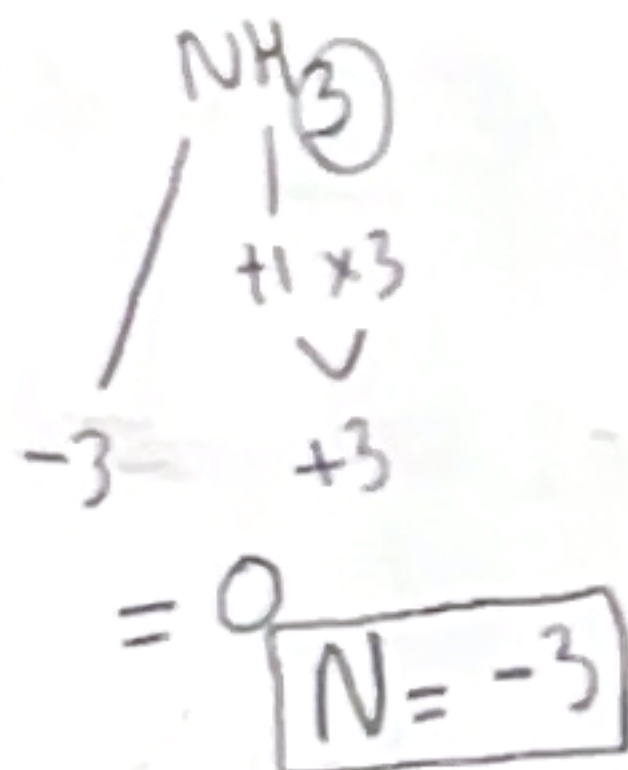


* NaOH

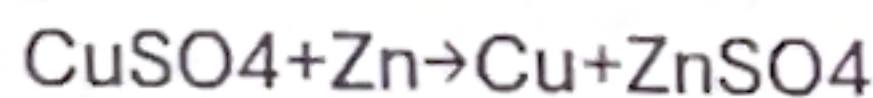
How do weak acid and bases dissociate in water?

Partially dissociate

Determine the oxidation state of the boldfaced element: NH_3 , $\text{Cr}_2\text{O}_7^{2-}$, N_2 , Na_2SO_3

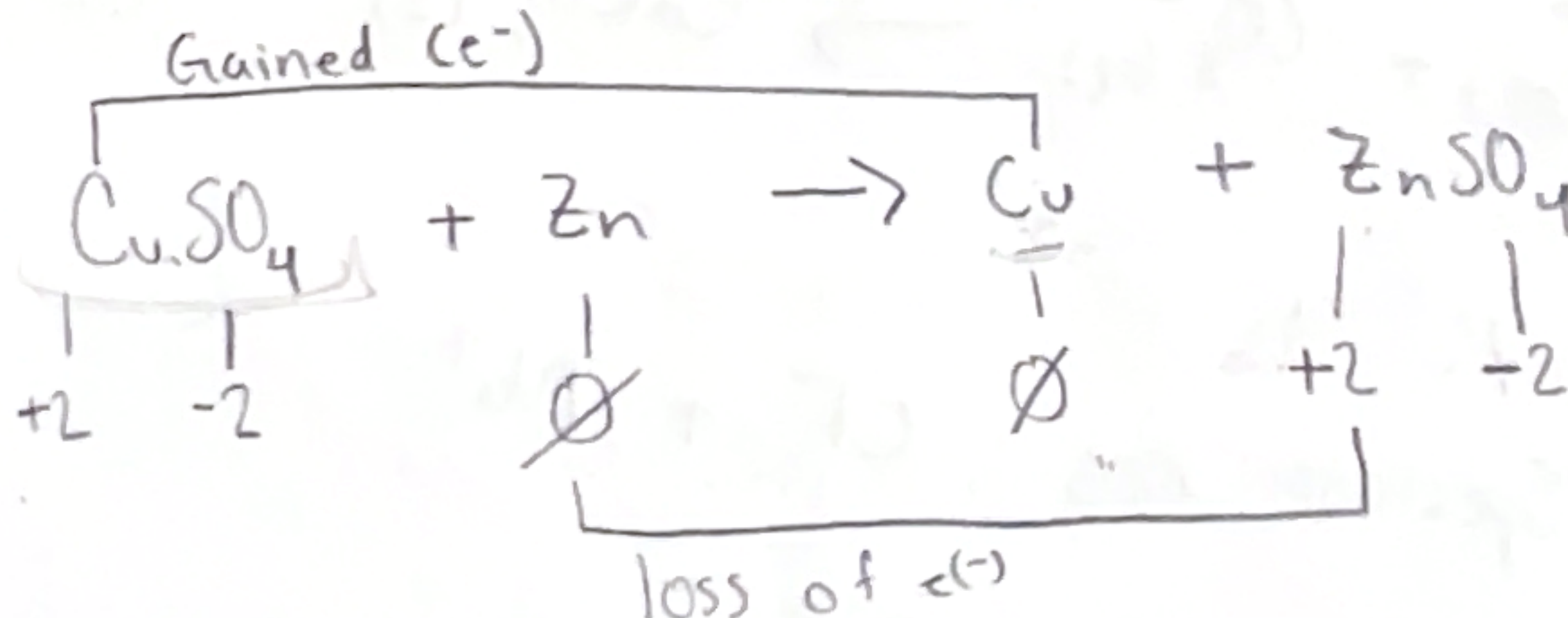


In the following reaction, what is oxidized and reduced? What is the oxidizing and reducing agents?



Loss of Electrons
 Oxidized

Gains Electrons
 Reduced



Zn: oxidized
 Cu: reduced

CuSO_4 : oxidizing agent
 Zn: reducing agent

Molarity

What is the concentration of a potassium chloride (KCl) solution if 18.5 g of KCl is dissolved in 150 mL of solution?

$$M = \frac{\text{mol}}{L} = \frac{0.248 \text{ mol KCl}}{0.15 L} = \boxed{1.65 M}$$

$$18.5 \text{ g KCl} \cdot \frac{1 \text{ mol}}{74.6} = 0.248 \text{ mol KCl}$$

$$150 \text{ mL} \cdot \frac{1 L}{1000 \text{ mL}} = 0.15 L$$

How many moles of NaCl are present in 0.500 L of a 0.250 M solution of NaCl?

$$M \cdot L = 0.250 \text{ mol/L} \cdot 0.500 L = \boxed{0.125 \text{ mol NaCl}}$$



You have a 12.0 M solution of sulfuric acid (H_2SO_4), and you need to prepare 250 mL of a 3.0 M H_2SO_4 solution. What volume of the 12.0 M stock solution will you need to dilute?

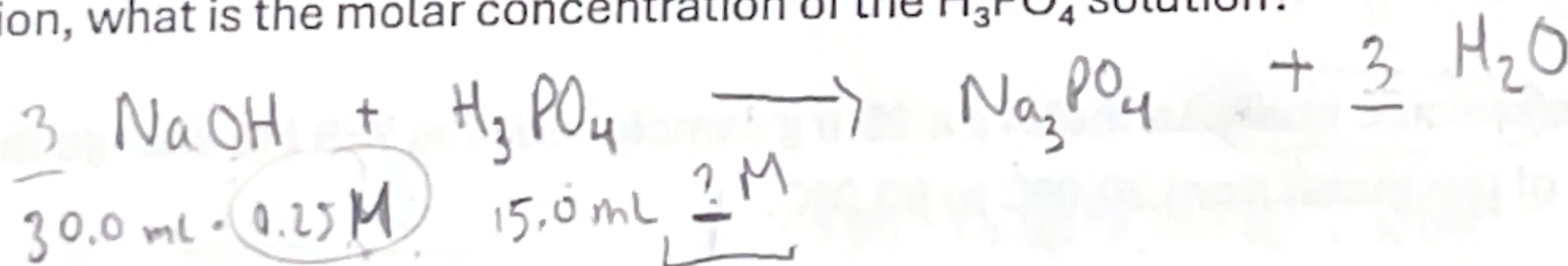
$$M_1 V_1 = M_2 V_2$$

$$(12.0)(V_1) = (3.0)(250)$$

$$V_1 = \frac{(3.0)(250)}{(12.0)} = \frac{(3.0)(0.250 L)}{12.0}$$

$$V = 0.0625 L$$

If it takes 30.0 mL of 0.25 M NaOH to neutralize 15.0 mL of H_3PO_4 (phosphoric acid) solution, what is the molar concentration of the H_3PO_4 solution?



$$30.0 \text{ mL} \cdot \frac{1 L}{1000 \text{ mL}} = 0.03 L \quad 0.25 \text{ mol/L} \cdot \frac{1 \text{ mol } H_3PO_4}{3 \text{ mol NaOH}} = 0.0025 \text{ mol } H_3PO_4$$

$$15.0 \text{ mL} \cdot \frac{1 L}{1000 \text{ mL}} = 0.015 L \quad H_3PO_4$$

$$M = \frac{0.0025 \text{ mol}}{0.015 L} = 0.166$$

$$\boxed{0.17 M \text{ } H_3PO_4}$$

$$1.7 \times 10^{-1} M$$

Will a reaction happen between Zinc metal and Copper (II) sulfate? If so, write the balanced equation. *Hint: Look at the activity series

Single
Replacement:



Yes; Zn is higher on activity series than Cu.

Energy is the ability to do work or transfer heat.

Energy can be converted from one form to another, but it can neither be created or destroyed.

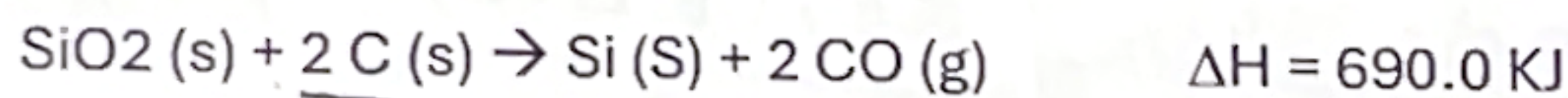
What is the change in internal energy of a system that releases 1800 J of heat and does 5300 J of work on the surroundings?

$$\Delta E = q + w$$

heat work

$$\Delta E = -1800 \text{ J} + -5300 \text{ J}$$
$$= \boxed{-7100 \text{ J}}$$

How much heat in kJ must be transferred to the following reaction to produce 298.0 g C from SiO_2 (silica) and C (carbon) according to following reaction scheme?



$$298.0 \text{ g C} \cdot \frac{1 \text{ mol}}{12.01 \text{ g}} \cdot \frac{690.0 \text{ kJ}}{2 \text{ mol}} = \boxed{8560. \text{ kJ}}$$

Calculate the specific heat of a metal if a 25.0 g sample requires 756 J to change the temperature of the metal from 20.0°C to 80.0°C .

$$q = m C \Delta T$$

$$C = \frac{q}{m \Delta T}$$

$$= \frac{756 \text{ J}}{(25.0 \text{ g})(60.0^\circ\text{C})}$$

$$= \boxed{0.504 \text{ J/g}\cdot^\circ\text{C}}$$

$$\Delta T = T_f - T_i \quad 80^\circ - 20^\circ = 60.0^\circ\text{C}$$

If $950. \text{ J}$ of heat is available, how many grams of aluminum (specific heat = $0.90 \text{ J/g}\cdot^\circ\text{C}$) can be heated from 15.0°C to 75.0°C ?

$$q = m C \Delta T$$

$$m = \frac{q}{C \Delta T}$$

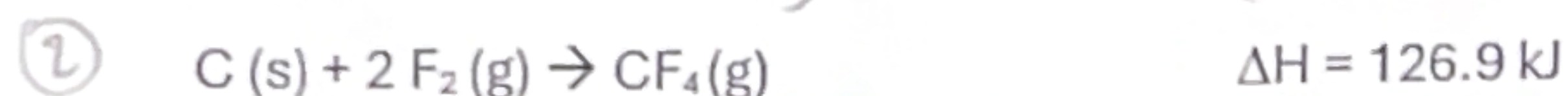
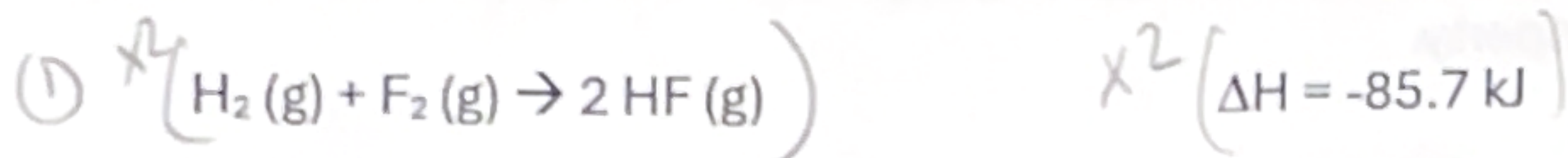
$$= \frac{950. \text{ J}}{(0.90 \text{ J/g}\cdot^\circ\text{C})(60^\circ\text{C})}$$

$$= \boxed{17.6 \text{ g Al}}$$

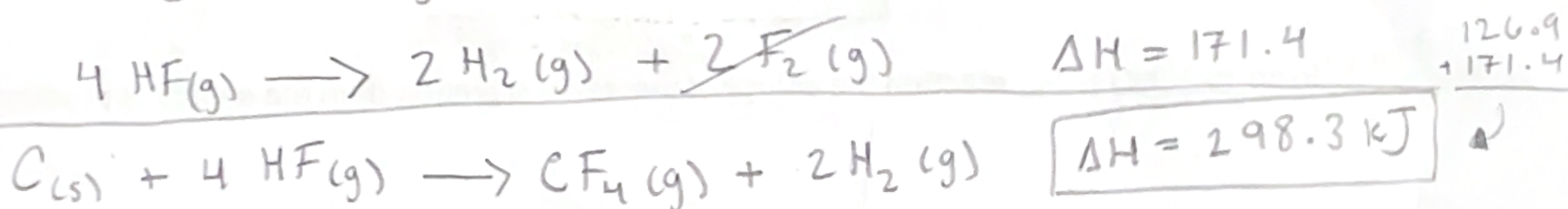
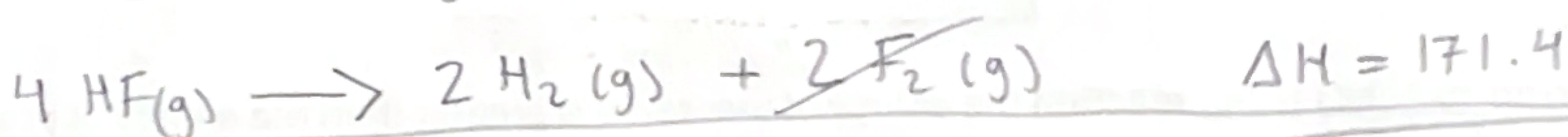
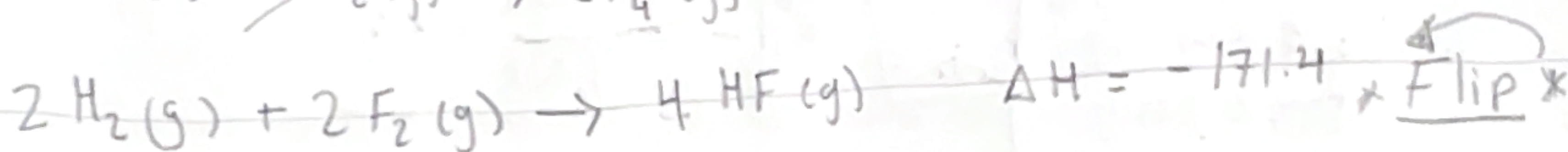
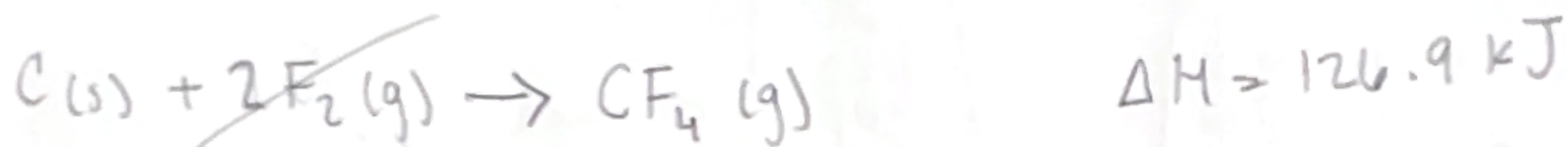
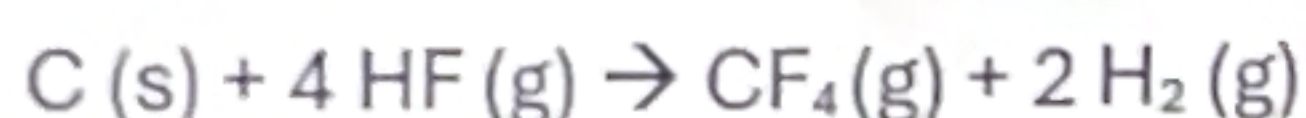
$$\Delta T = T_f - T_i$$

$$75 - 15 = 60$$

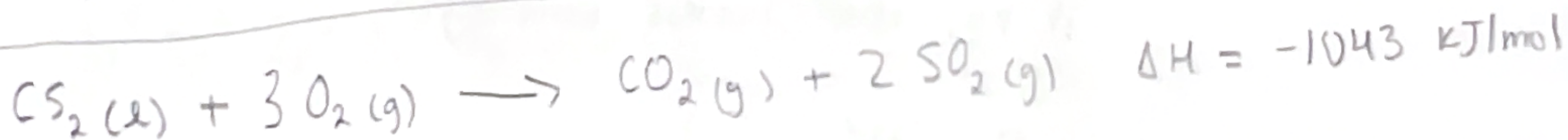
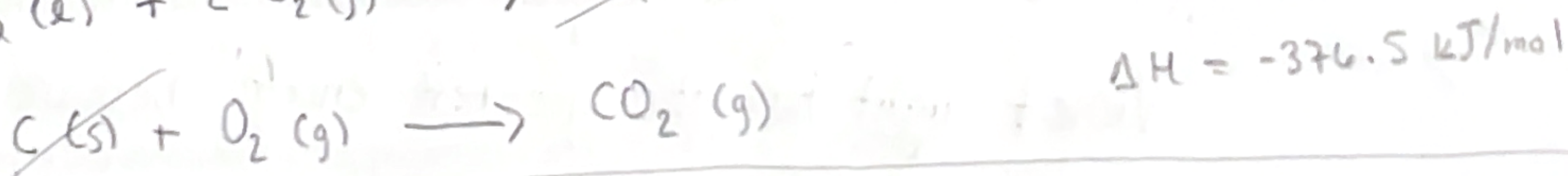
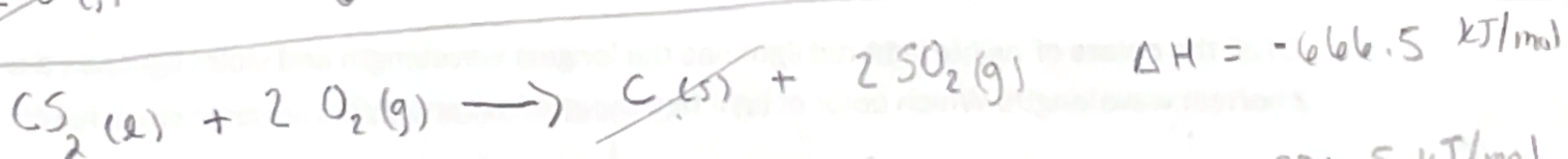
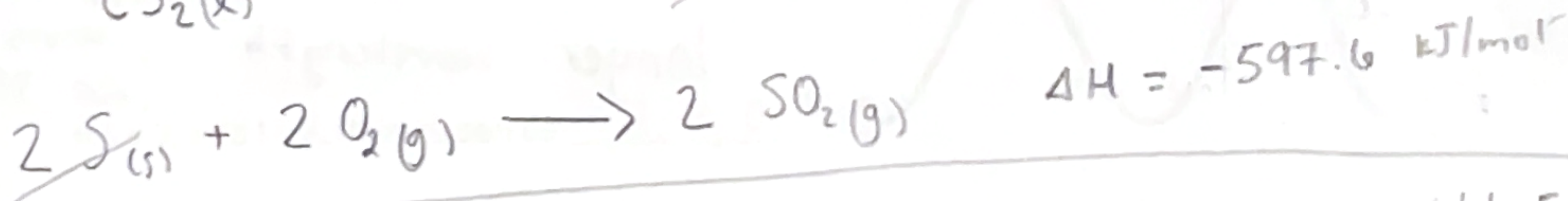
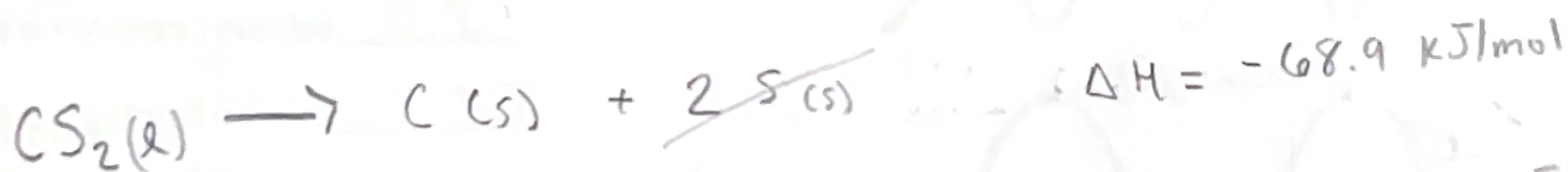
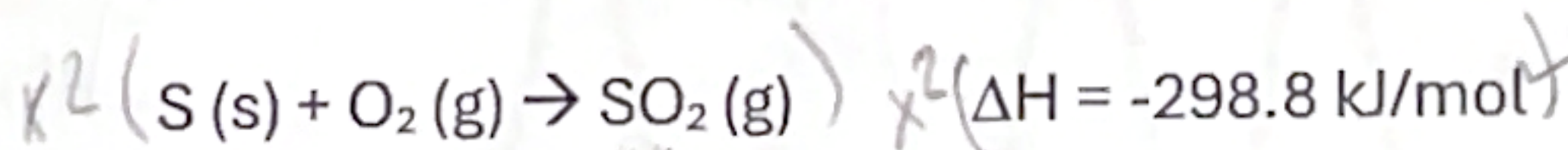
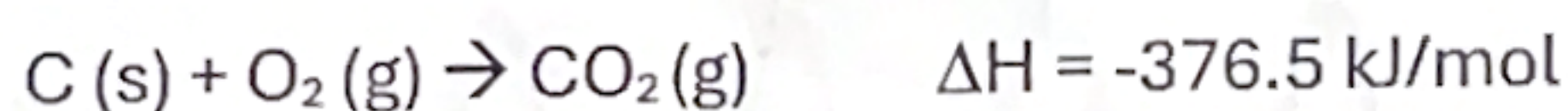
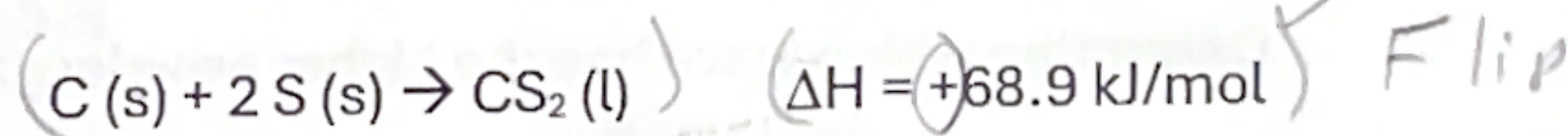
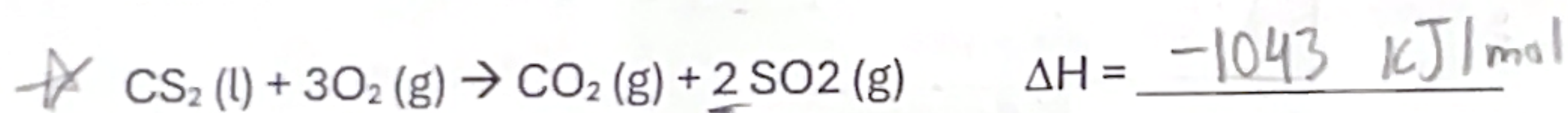
Using the equations:



Determine the molar enthalpy (in KJ) for the reaction:

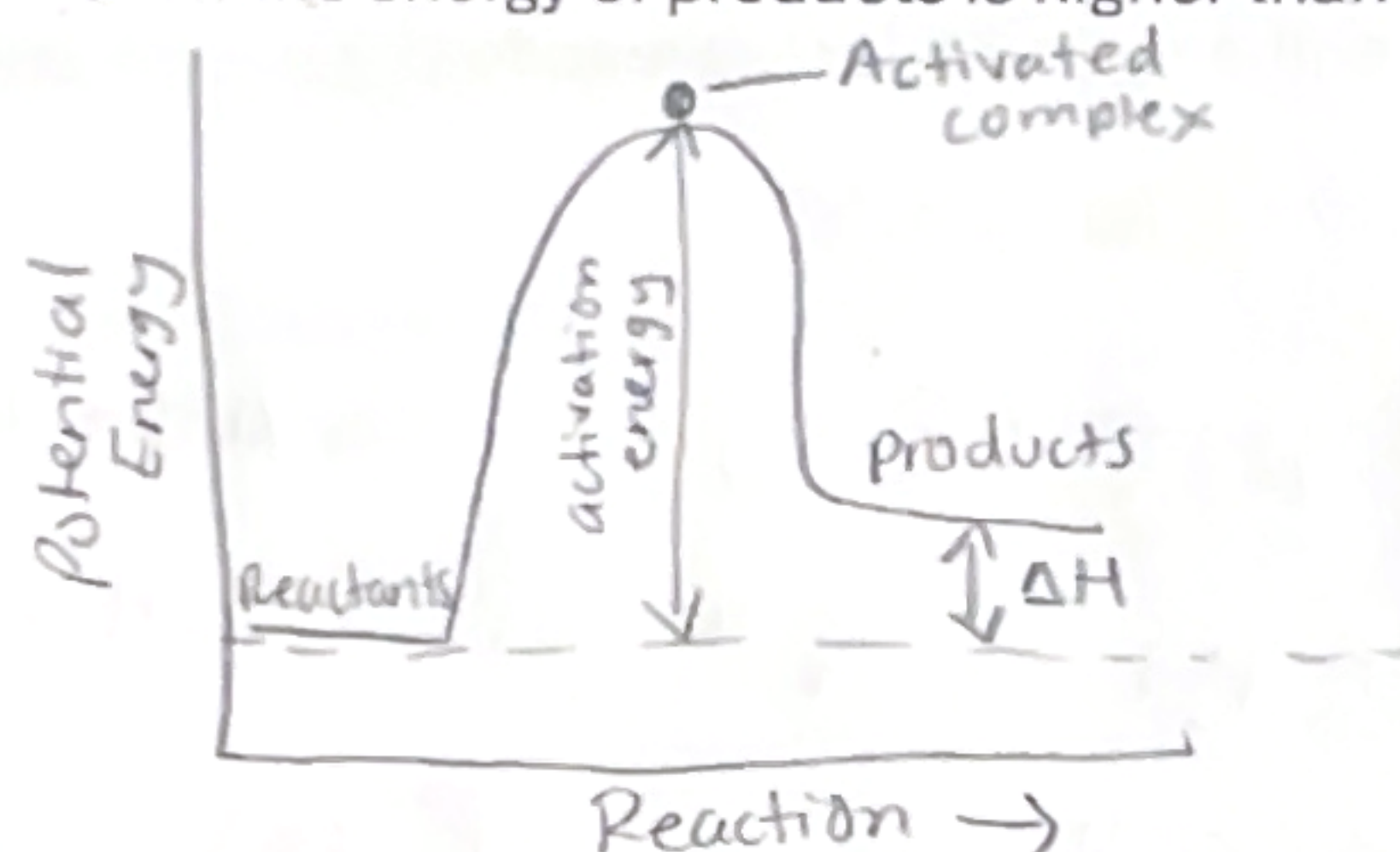


Determine the ΔH for the following reaction using the three chemical reactions. Round your answer to four significant figures.

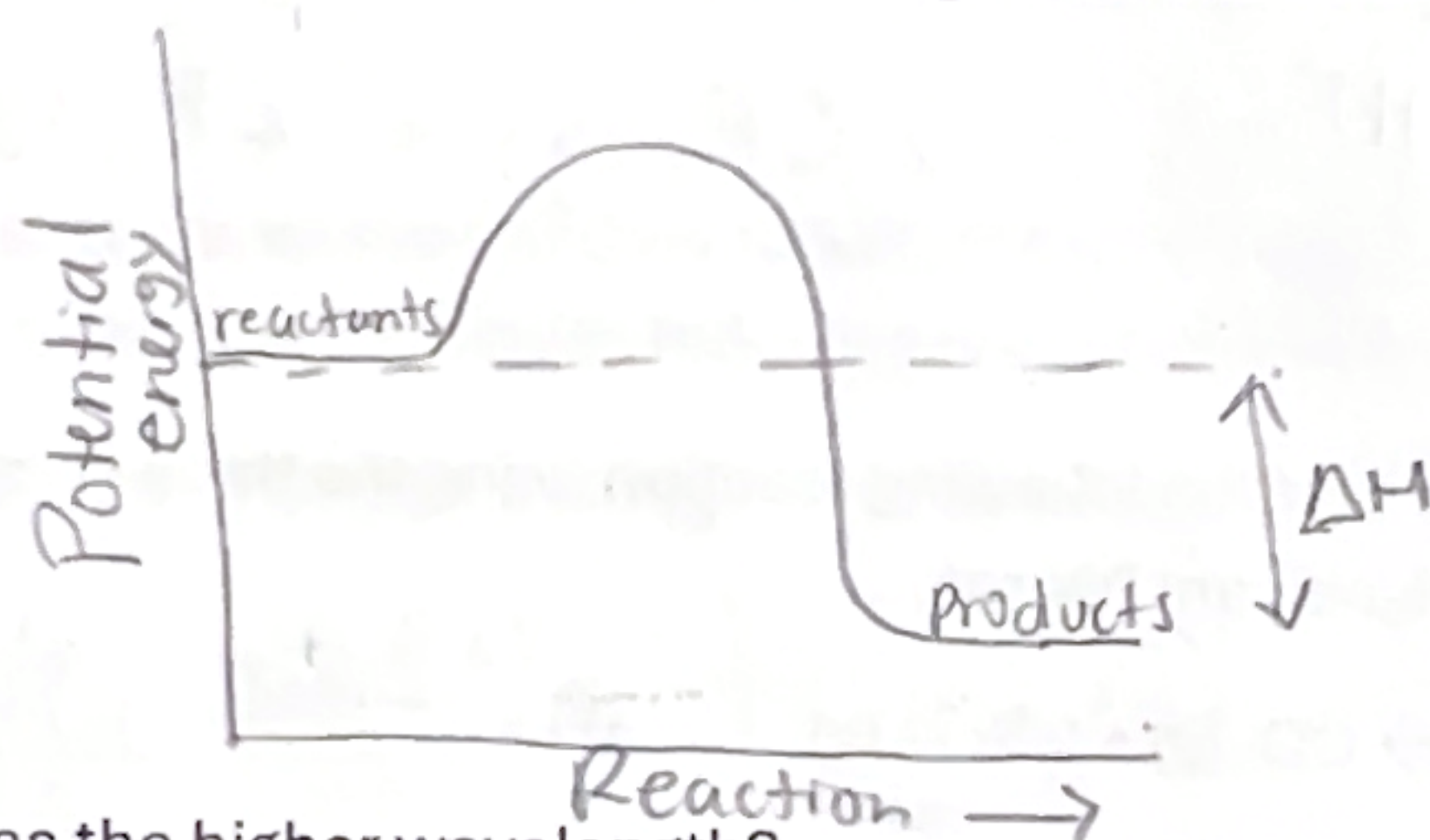


In thermodynamics Enthalpy, is the internal energy plus the product of pressure and volume, an extensive property.

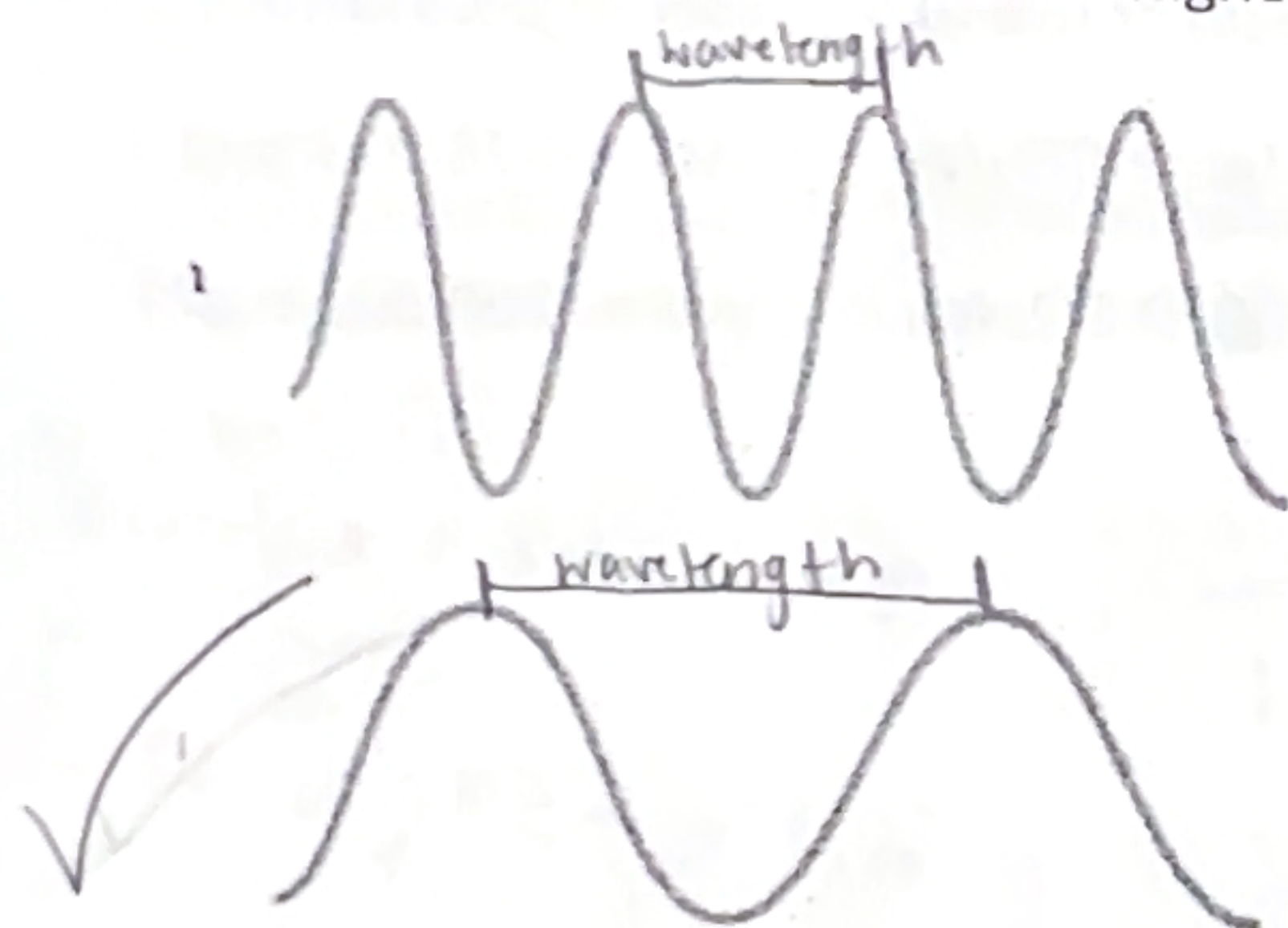
In an endothermic reaction the energy of products is higher than the energy of reactants.



In an exothermic reaction the energy of reactants is greater than the energy of products.



Determine which wave has the higher wavelength?



Shorter wavelength

* Blue has shorter waves
(450-495 nm)

longer wavelength

* Red has longer waves
(620-750 nm)

Of all the colors of visible light red light has the longest wavelength and violet light has the shortest wavelength. Which color of light has the greatest energy?

Violet light has the greatest energy because it has the shortest wavelength

remember: $C = \lambda \nu$
Speed of light wavelength frequency

unit:
Hz

What is the frequency of electromagnetic radiation that has a wavelength of $5.6 \times 10^8 \text{ nm}$?

$$c = \lambda \cdot \nu$$

$$\nu = \frac{c}{\lambda} = \frac{3.00 \times 10^8 \text{ m/s}}{0.56 \text{ m}} = 5.4 \times 10^8 \text{ Hz}$$

$$5.6 \times 10^8 \text{ nm} \cdot \frac{1 \times 10^{-9} \text{ m}}{1 \text{ nm}} = 0.56 \text{ m}$$

What is the energy (E) of a photon of green light with a wavelength of 580. nm?

$$E = \frac{h \cdot c}{\lambda} = \frac{(6.626 \times 10^{-34} \text{ J} \cdot \text{s}) (3.00 \times 10^8 \text{ m/s})}{5.8 \times 10^{-7} \text{ m}}$$

h (Planck's constant)

$$h = 6.626 \times 10^{-34} \text{ J} \cdot \text{s}$$

c (speed of light)

$$c = 3.00 \times 10^8 \text{ m/s}$$

$$= 3.427 \times 10^{-19} \text{ J}$$

$$= 3.43 \times 10^{-19} \text{ J}$$

$$580 \text{ nm} \cdot \frac{1 \times 10^{-9} \text{ m}}{1 \text{ nm}} = 5.8 \times 10^{-7} \text{ m}$$

What shape are s orbitals? What shape are p orbitals?

s orbitals have a spherical shape

p orbitals have a hourglass or dumbbell shape

The relationship between n and l: $l \leq n-1$

$$l \leq n-1$$

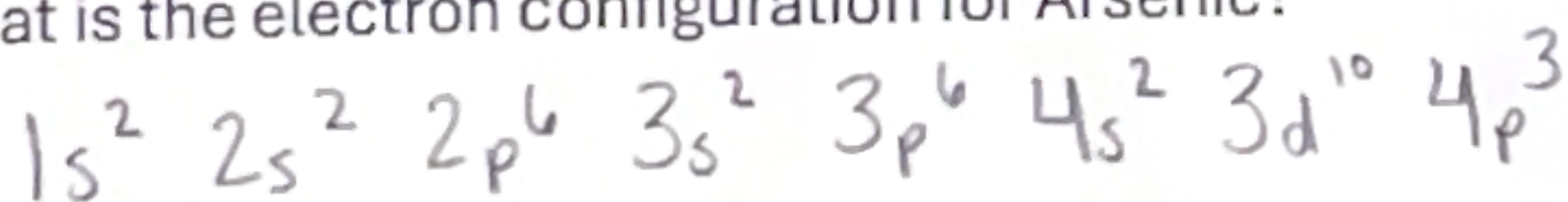
If n = 1, then l can only be 0

If n = 2 then l can be 0, 1

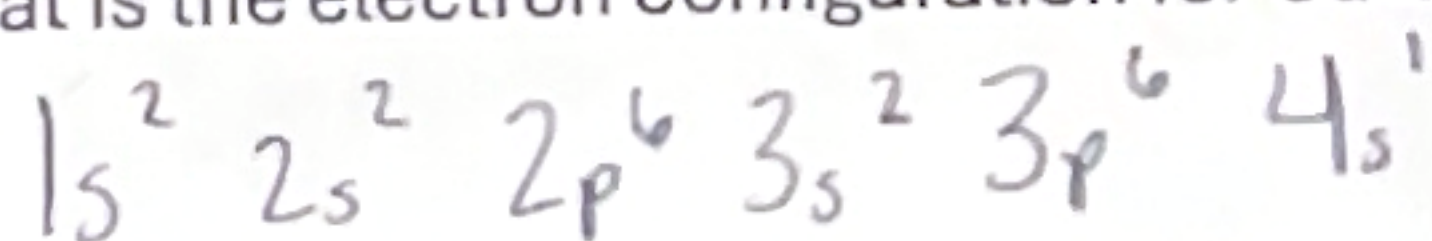
If n = 3 then l can be 0, 1, 2

If n = 3, and l = 2, then m_l can be -2, -1, 0, 1, 2

What is the electron configuration for Arsenic?



What is the electron configuration for Ca^{+2} — lost an electron cation



$$\begin{aligned} s \text{ orbital} &= 0 \\ p \text{ orbital} &= 1 \\ d \text{ orbital} &= 2 \\ f \text{ orbital} &= 3 \end{aligned}$$

What would be the quantum numbers (n , l , and m_l) if you are given phosphorus?

Write electron configuration first: $1s^2 2s^2 2p^6 3s^2 \underline{3p^3}$

$$n=3 \quad l=1 \quad m_l=1$$

1	1	1
-1	0	1

valence e^-

What would be the quantum numbers (n , l , m_l , and m_s) if you are given chlorine?

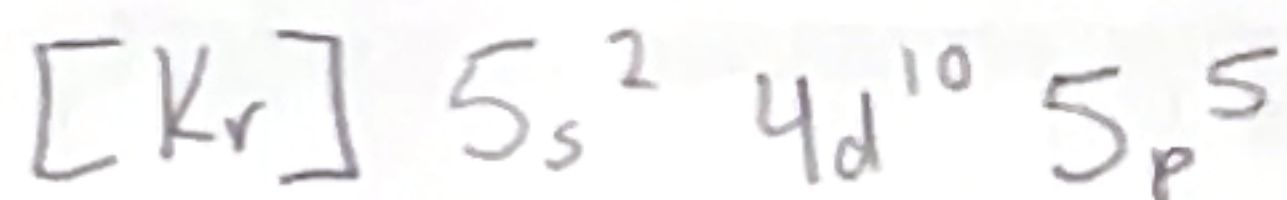
Write electron configuration first: $1s^2 2s^2 2p^6 3s^2 \underline{3p^5}$

$$n=3 \quad l=1 \quad m_l=0 \quad m_s=-\frac{1}{2}$$

1	1	1
-1	0	1

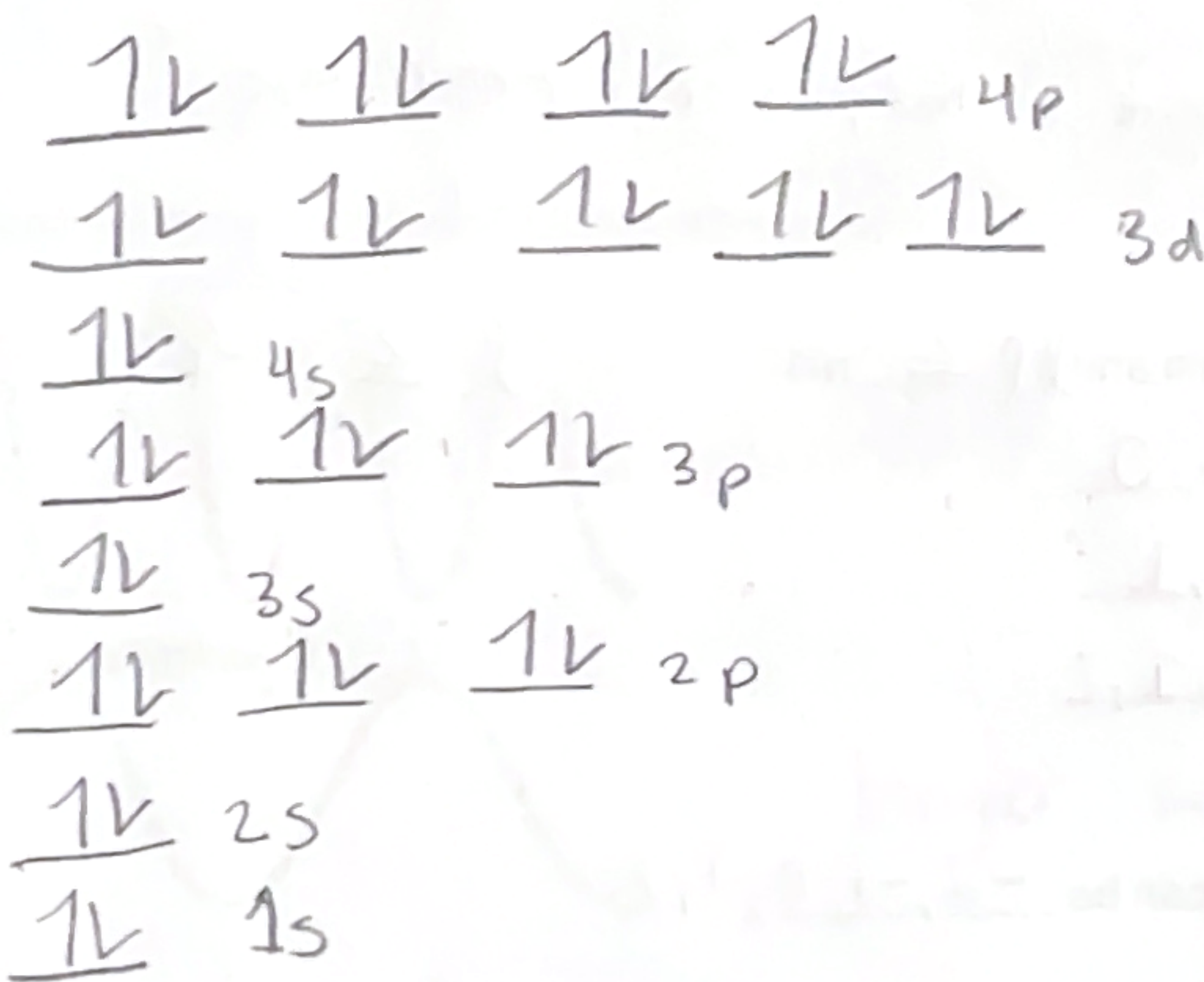
* Fill up 1 across all the way then go back & fill Down

What is the condensed electron configuration for Iodine?



In the following space draw the energy level for Krypton:

* For your exam you'll be given the lines or subshells to fill in. All you'll have to do is draw in your arrows



* Use your periodic table to get the electron configuration