**Station 1:**

What are the FIVE major factors that affect reaction rate?

**Station 2:**

Why would a mixture of gases react faster when the volume they occupy is decreased?

Why would iron filings rust faster than an iron nail?

What is the effect of a catalyst on the required energy to achieve effective collisions?

**Station 3:**

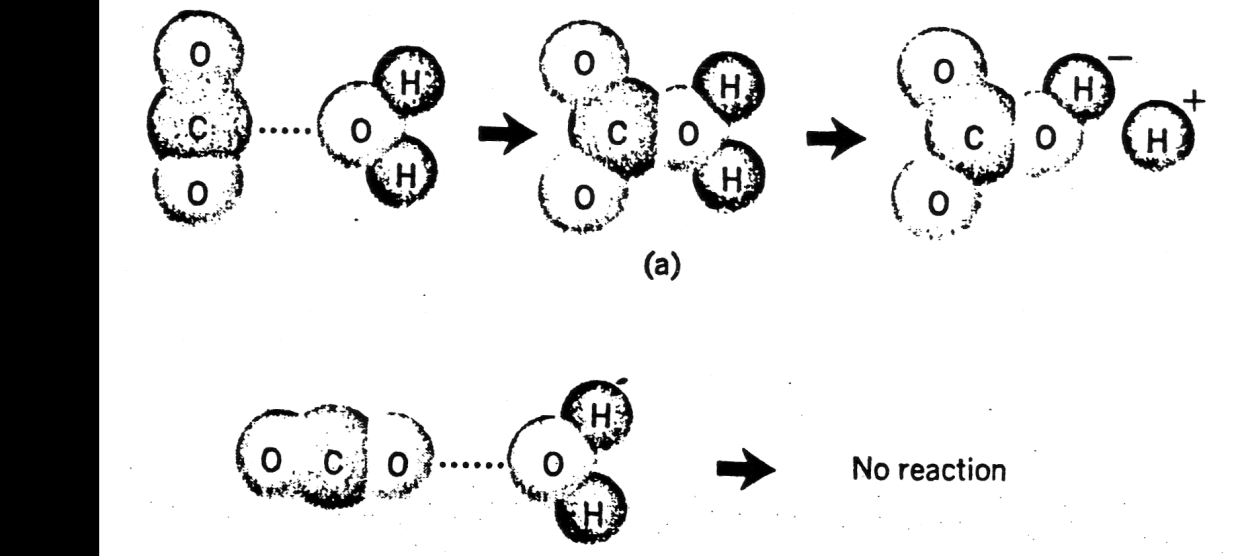
1. Classify these reactions as exothermic or endothermic:
   1. energy + SO2 (g) → S (g) + O2 (g)
   2. C8H18 (g) + O2 (g) → CO2 (g) + H2O (g) + energy
   3. energy + P4O10 (s) → P4 (s) + 5 O2 (g)
   4. Mg (s) + H2SO4 (aq) → MgSO4 (aq) + H2 (g) + energy

**Station 4:**

1. Consider the combustion of nitrogen monoxide:

NO(g) + ½ O2(g) https://docs.google.com/drawings/d/sH18mapQR23e4O9n1bktS9A/image?w=31&h=3&rev=1&ac=1NO2(g) Δ*H* = -56.5 kJ

How much heat would be released by the combustion of 65 g of O2 (g)?

**Station 5:** In the reaction below explain what is happening. In A) a rxn happens but B) no rxn happens. Why could this be? A

What is this (labelled a in the picture)  
 B

**Station 6:**

Example: NH4+ (aq) + NO2- (aq)  https://docs.google.com/drawings/d/shmyrKaa0zrXukAAJpq5vRA/image?w=52&h=3&rev=1&ac=1 N2 (g) + 2 H2O (l)

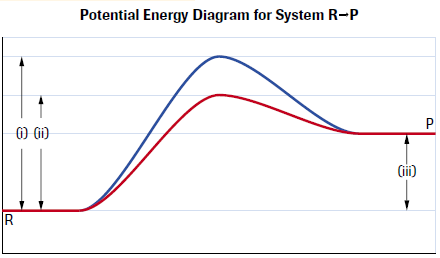
Suppose r = k[NH4+] [NO2-]

The rate of this reaction is 5.4 x 10-7 mol/L∙s when [ NH4+]= 0.0100 mol/L and

[NO2-]=0.200 mol/L.

Calculate the new rate of the reaction when [ NH4+]= 0.100 mol/L and   
[NO2-]=0.255 mol/L.

**Station 7:**

1. Use the potential energy diagram shown below to answer the following:
   1. Label the axis.
   2. What does each curve represent?
   3. What type of reaction is occurring in terms of energy flow to or from the surroundings?
   4. What does each number

**Station 8:**

A proposed mechanism for the reaction between iodine chloride gas and hydrogen gas is shown below.

ICl (g) + H2 (g) → HI (g) + HCl (g) (slow)

HI (g) + ICl (g) → HCl (g) + I2 (g) (fast)

a) Write the balanced equation for the overall reaction.

b) What are the reactions intermediates (if any)?

c) The rate law equation was determined experimentally to be   
r = k[ICl][H2]. Does the proposed mechanism above agree with the experimental results? If it does not agree, explain why not.

**Station 9:**

Consider the following reaction that occurs in the atmosphere on a smoggy day:

NO (g) + O3 (g) → NO2 (g) + O2 (g) r = k[NO]

Which of the following mechanisms is consistent with this rate law? Explain.

**a)** NO + O3 → NO2 + O2 (slow)

**b)** NO → N + O (slow)

N + O3 → NO2 + O (fast)

O + O → O2 (fast)

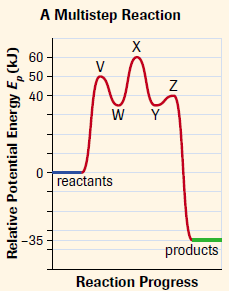
NO + O3 → NO2 + O2 (overall)

**c)** O3 → O2 + O (slow)

O + NO → NO2 (fast)

NO + O3 → NO2 + O2 (overall)

**Station 10:**

Use the multi-step reaction shown to the right to answer the following:

* 1. What is the overall activation energy for the reaction?
  2. What is the reaction enthalpy (ΔH) for the reaction?
  3. What is the rate-determining step for the reaction?
  4. Is the reaction exothermic or endothermic?
  5. Which letters represent activated complexes?
  6. Which letters represent reaction intermediates?

**Station 11:**

The activation energy of a forward and reverse reaction are as follows:

i) C2H4 (g) + H2 (g) https://docs.google.com/drawings/d/s_xIJ9OXvetGbNtCzeLrdOg/image?w=41&h=3&rev=1&ac=1C2H6 (g) Ea = 180 kJ/mol

ii) C2H6 (g) https://docs.google.com/drawings/d/su3_veFY3S_xe62Dub-e0Kw/image?w=41&h=3&rev=1&ac=1C2H4 (g) + H2 (g) Ea = 317 kJ/mol

a) Draw a potential energy diagram for this reversible reaction.

b) Calculate the enthalpy change (∆H) for each reaction.