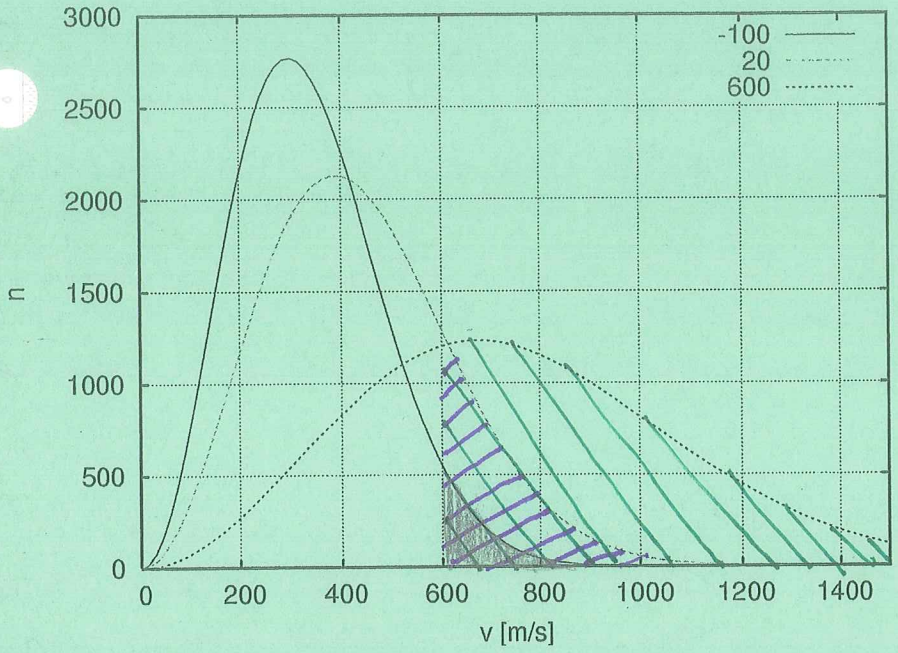
BETH "KEY"

Maxwell-Boltzmann Distribution



The three lines on the graph are the same gas (both type and amount) for different temperatures. I will refer to them as either solid, (-100), dashed (20) and dotted (600). The Y-axis is the number of molecules that have a given speed.

1) Why is speed equivalent to temperature?

Temperature is a measure of average K.E.

2) Do all molecules at the same temperature...
   a. have the same speed? Y/(N)
   b. have the same average speed? (Y)/N

3) State three differences in the size/shape of the curve for higher temperatures.

The curve for higher temperatures is broader, but lower.

4) How many molecules have the following speeds:

Speed	Number of gas particles (SOLID LINE)	Number of gas particles (DASHED LINE)	Number of gas particles (DOTTED LINE)
200	2,200	1,200	250
400	2,250	2,100	800
600	550	1,250	1,200

5) Will the area under the solid line = the area under the dashed line? Will either equal the area under the dotted line?

The area under each line/curve is equal.

6) With a pencil shade in the area that corresponds to all the molecules that have speeds of 600 m/s or greater for the solid line graph.

7) Using a different kind of shading (slanted lines of opposite directions, etc.), show all the molecules that have speeds of 600 m/s or great for the dashed lines and dotted lines.

8) Which temperature has the most molecules with speeds above 600 m/s?

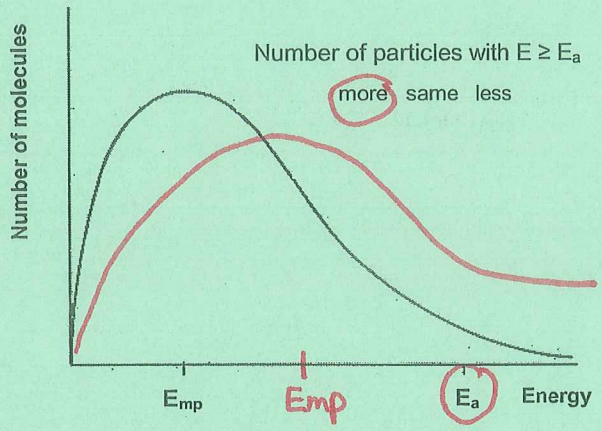
Dotted - 600

MAXWELL-BOLTZMANN CURVES

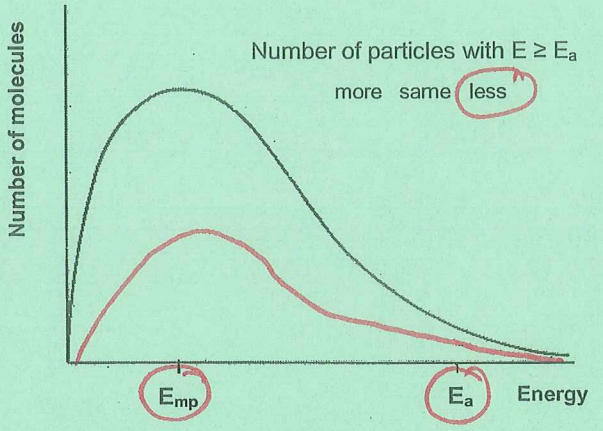
For each of the following

a) Sketch the new shape of the distribution curve
b) Indicate the new most probable energy (E_{mp}) if it changes
c) Indicate the new activation energy (E_a) if it changes
d) Indicate whether the number of particles with energy ≥ activation energy increases, decreases or stays the same

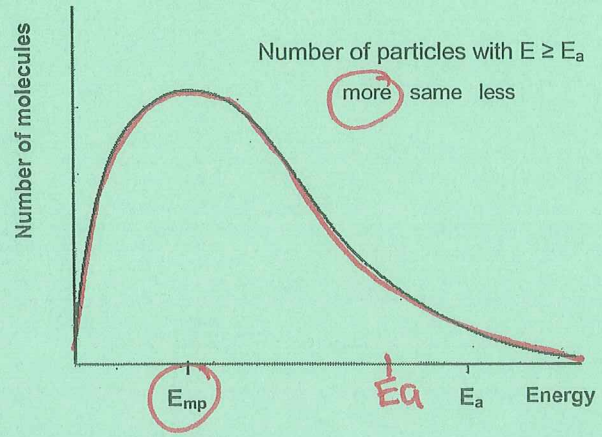
1) Increase the temperature



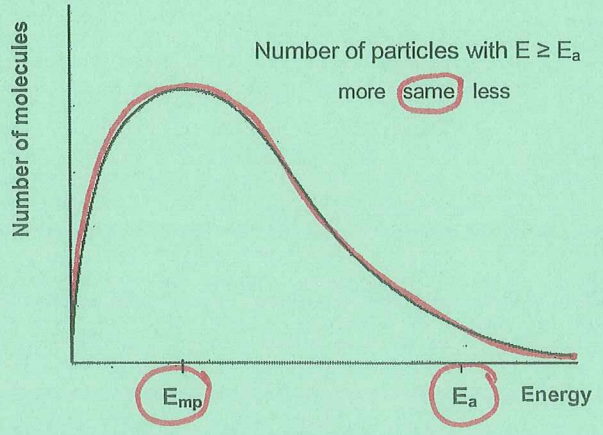
2) Remove half the molecules (at constant temperature)



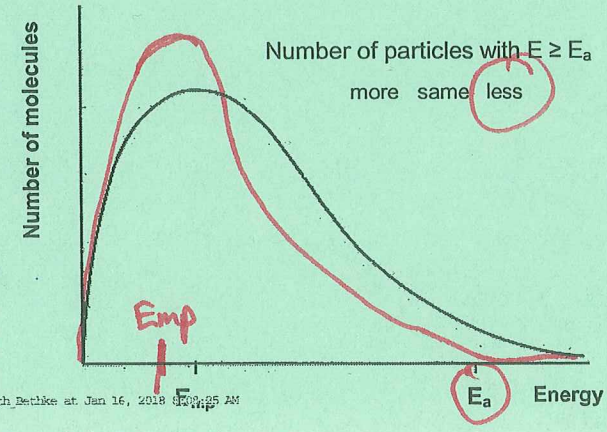
3) Add a catalyst (at constant temperature)



4) Reduce the volume of the container (at constant temp.)



5) Reduce the temperature



6) Add an inert gas (at constant temperature)