1. Gold melts at 1063 °C and boils at 2970 °C. Mention what forms of motion (rotation, translation, vibration) apply to gold atoms at each of the following temperatures.

a. -273 C

b. 200 C

c. 1500 C

d. 3244 K

2. By what factor will the pressure of a gas change if its volume is compressed from 20 L to 15L while its temperature increases from 20 °C to 30 °C ?

3. A tank containing hydrogen (H_2) weighs 40.15 kg. The mass of the empty tank was 40.00 kg.

According to the manometer, the pressure is 500 kPa; its temperature is 20 °C. What is the volume of the tank? Is it big enough to supply you with a litre per day for a year?

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– A. A. Milne

4. $Fe + 0.5\ O_2 \rightarrow FeO + 266.5\ kJ$

   $2\ Fe + 3/2\ O_2 \rightarrow Fe_2O_3 + 822.2\ kJ$

Find the amount of heat involved in the formation of 1 mole of Fe_2O_3 from O_2 and FeO.

5. Ludovic poured 200 mL of a 0.1 M LiOH solution into a 300 mL solution of acetic acid. The neutralization effect increased the temperature of the aqueous solution from 20 °C to 35 °C.

Calculate the molar heat of reaction per mole of LiOH.

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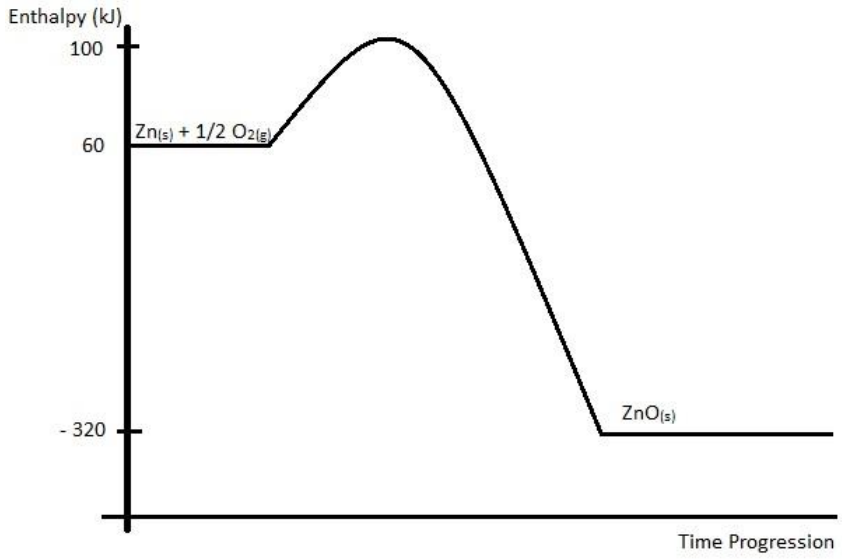
6. You are given the energy diagram below for the oxidation reaction of zinc metal.



Based on the above diagram:

a) What is the activation energy of the forward reaction? _____

b) What is the activation energy of the **reverse** reaction? _____

c) Determine the change in enthalpy of the **reverse** reaction. _____

d) Is the decomposition of $ZnO_{(s)}$ an exothermic or endothermic reaction? Justify.

_____

_____

e) Fill in the energy missing in the balanced chemical equation shown below.

$$2\ Zn_{(s)} + O_{2(g)} \rightarrow 2\ ZnO_{(s)} + \_\_\_\_\_ kJ$$

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