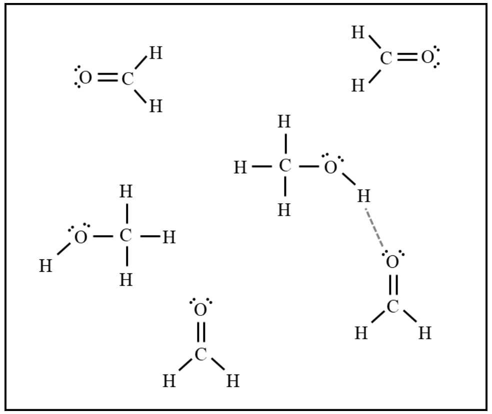
Question 4: Short Answer — 4 points

A For the correct answer: **Point 01**

sp^2

B For a correct diagram: **Point 02**

The diagram should show a dashed line between the O *atom in one* H_2CO *molecule and the* H *atom in the* –OH *group of one* CH_3OH *molecule. See example response below.*



C (i) For a correct proposal: **Point 03**

The proposed temperature should be in the range 181 K – 254 K .

(ii) For the correct calculated value: **Point 04**

$$8.59\text{ g }CH_3OH \times \frac{1\text{ mol }CH_3OH}{32.04\text{ g }CH_3OH} \times \frac{-37.6\text{ kJ}}{1\text{ mol }CH_3OH} = -10.1\text{ kJ}$$ *, so* 10.1 kJ *are removed.*

Question 5: Short Answer — 4 points

A For the correct answer: **Point 01**

Tetrahedral

B For the correct answer and a valid justification: **Point 02**

Agree. Compound Y *has a larger, more polarizable electron cloud because the* Si *atom has more occupied electron shells than the* C *atom, giving compound* Y *stronger London dispersion forces and a higher boiling point than compound* X.

C For the correct answer and a valid justification. **Point 03**

Examples of acceptable responses may include the following:

- *Compound* X. *Compound* X *has weaker intermolecular forces than compound* Y*, so molecules of* X *are more likely to be in the gas phase at* 82°C *and would therefore have a higher vapor pressure.*
- *Compound* X. *At* 82°C*, compound* X *has reached its boiling point, but compound* Y *has not. Therefore, the proportion of* X *molecules in the vapor phase would be much greater than that of compound* Y*, giving compound* X *the higher vapor pressure.*

D For the correct calculated value: **Point 04**

$$PV = nRT$$

$$n = \frac{PV}{RT} = \frac{(2.30\text{ atm})(12.5\text{ L})}{(0.08206\frac{\text{L}\cdot\text{atm}}{\text{K}\cdot\text{mol}})(471\text{K})} = 0.744\text{ mol}$$