

## **Tutorial 1**

### **CSO203: Inorganic Molecules, Materials & Medicines**

1. Draw a labelled energy profile for an exothermic reaction. Explain the transition state.
2. How does the Haber-Bosch process differ from the Haber process for  $\text{NH}_3$  synthesis?
3. Explain the brown and blue ammonia. How can one prepare green ammonia?
4. Why does ammonia production require higher temperature and pressure? Explain it in the light of Gibbs' free energy concept.
5. How do the entropy, enthalpy, and temperature influence the Gibbs' free energy?
6. Write an equation of equilibrium constant,  $K_p$ , written in terms of partial pressures for  $\text{NH}_3$  preparation.
7. Calculate the  $K_p$  of the reaction at  $\Delta G^0 = -32.8 \text{ kJ/mol}$ .