1. B₂ is paramagnetic with a bond order of 1

2. B₂ and O₂ are paramagnetic
   Li₂, B₂, and F₂ have bond orders of 1
   C₂ and O₂ have bond orders of 2
   N₂ has the highest bond order: 3

3. a. Cl₂ is diamagnetic; HOMO is \( \pi^* \)₃p
   b. Ar₂⁺ is paramagnetic; HOMO is \( \sigma^* \)₃p
   c. N₂ is paramagnetic; HOMO is \( \pi^* \)₂p
   d. CN is paramagnetic; HOMO is \( \sigma_2p \)

4. 0.043 m; \( X_{\text{solute}} = 7.8 \times 10^{-4} \); Weight % acid = 0.51%

5. 56.82 g solution

6. 2.57 \times 10⁻⁵ M

7. \( X_{\text{AgNO}_3} = 0.0282 \)

8. \( P_{\text{solution}} \) = 22.6 torr

9. \( P_{\text{H}_2\text{O}} \) = 694 torr

10. \( X_{\text{C}_6\text{H}_12} = 0.672 \)

11. 115.384 mm Hg

12. \( k_f = -5.3 \degree C/m \)

13. 177.74 \degree C

14. 7.64 \times 10⁴ g/mol

15. \( \Pi = 0.058 \) atm

16. a. \(-\frac{1}{2} \Delta [\text{O}_2] = \frac{1}{3} \Delta [\text{O}_3] \)
    b. \(-\frac{1}{2} \Delta [\text{HOF}] = \frac{1}{2} \Delta [\text{HF}] = \Delta [\text{O}_2] \)

17. \( k = 0.0392 \) h⁻¹

18. Fraction remaining = 0.030

19. \( k = 0.0127 \) min⁻¹; The rate when \([\text{N}_2\text{O}] = 0.035 \) mol/L is 4.4 \times 10⁻⁴ mol/L·min