

### Homework Set #13 Solutions (12/1 - 12/5):

Chapter 20: **Questions** 24, 39, 48 **Exercises** 14, 17, 19

#### **Questions:**

24. When you slowly bring the negatively charged rod near an electroscope, the leaves will move farther apart if they are negatively charged and closer together if they are positively charged.
39. The force of C on A is to the right and is four times greater than the force of B on A, which is down. Adding these vectors produces a force in the direction indicated by choice 3.
48. 100 Newtons directed to the right.

#### **Exercises:**

$$17. E = k \frac{Q_1 - Q_2}{r^2} = \left( 9 \times 10^9 \frac{\text{N} \cdot \text{m}^2}{\text{C}^2} \right) \frac{4 \text{ C}}{(1 \text{ m})^2} = 3.6 \times 10^{10} \text{ N/C toward the 2 - C charge}$$

$$14. E = k \frac{2Q}{r^2} = (9 \times 10^9 \frac{\text{N} \cdot \text{m}^2}{\text{C}^2}) \frac{2(1.6 \times 10^{-19})}{(10^{-10} \text{ m})^2} = 2.88 \times 10^{11} \text{ N/C toward the electron}$$

$$17. PE_B = PE_A + \Delta PE = PE_A - \Delta KE = 50 \text{ J} - 30 \text{ J} = 20 \text{ J}$$

$$23. PE_B - PE_A = (4 \times 10^{-3} \text{ C})(12 \text{ V}) - 48 \text{ J} = 48 \text{ J} - 48 \text{ J} = 0 \text{ J}$$

$$19. W = Q\Delta V = (2 \times 10^{-3} \text{ C})(12 \text{ V}) = 24 \times 10^{-3} \text{ J} = 24 \text{ mJ}$$

Chapter 23: **Questions** 4, 9 **Exercises** 1, 6

#### **Questions:**

4. Fluorine, bromine, iodine, and astatine have similar properties to chlorine.
9. Element A and element B are in sample a, which accounts for all the spectral lines.

#### **Exercises:**

$$1. \frac{q}{m} = \frac{1.6 \times 10^{-19} \text{ C}}{9.11 \times 10^{-31} \text{ kg}} = 1.76 \times 10^{11} \text{ C/kg}$$

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$$6. r_{\text{electron}} \approx 10^{-15} \text{ m}, r_{\text{nucleus}} \approx 10^{-14} \text{ m} \quad (5 \times 10^{-15} \text{ m}) \approx 50000 \text{ m}$$

