

19F-CHEM14A-2 Quiz 1

VIBHA GURUNATHAN

TOTAL POINTS

5 / 5

QUESTION 1

1 Miles Per gallon 2 / 2

- ✓ + 0.5 pts Correct
- ✓ + 0.5 pts Match Energy Units (J to kJ or vice versa)
- ✓ + 0.5 pts Efficiency Conversion
- ✓ + 0.5 pts Use J/mile term to convert to miles/gallon
- + 0 pts Incorrect

QUESTION 2

Potassium Photoelectric Effect 2 pts

2.1 Energy absorbed by the electron in eV 1

/ 1

- + 0 pts Incorrect
- + 0.5 pts $h(1.2E15) = 7.9512E-19J$
- ✓ + 0.5 pts $E=hv$
- ✓ + 0.5 pts $h(1.3E15)=8.6138E-19J$

2.2 Kinetic Energy 1 / 1

- + 0 pts Incorrect or no work
- ✓ + 0.5 pts $KE=hv-workf.$
- + 0.5 pts $(8.0-6.95)E-19= 1E-19J$
- ✓ + 0.5 pts $(8.6-6.95)E-19= 1.6E-19J$

QUESTION 3

3 Electrons and neutrons etc 1 / 1

- ✓ + 0.75 pts Different number of neutrons (quiz a)
- Different number of electrons (quiz b)
- ✓ + 0.25 pts Different atomic mass (quiz a)
- Different charge (quiz b)
- + 0 pts Incorrect

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1) You wish to calculate the theoretical miles per gallon of your car. You know that one gallon of gasoline contains 1.203×10^8 joules. However, your car's engine can only make use of 40% of this energy. Also, your car requires 1.1×10^3 kilojoules to travel one mile. How many miles per gallon do you expect from your car?

$$(1.203 \times 10^8 \text{ J}) \times 0.4 \rightarrow 1 \text{ gal} \quad \frac{1 \text{ mile}}{1.1 \times 10^3 \text{ kJ}} \times \frac{1 \text{ kJ}}{1000 \text{ J}} \times \frac{1.203 \times 10^8 \text{ J}}{1 \text{ gal}} \times 0.4$$

$$1.1 \times 10^3 \text{ kJ req/mile} = \boxed{43.745 \text{ miles/gal}}$$

$$\frac{1.1 \times 10^3 \text{ kJ} \times 1000 \text{ J}}{1 \text{ mile}} \times \frac{1 \text{ gal}}{1.203 \times 10^8 \text{ J}}$$

2) Potassium has a work function of 6.9545×10^{-19} joules. A photon with frequency 1.3×10^{15} Hz strikes a sample of potassium.

A) How much energy is contained in the photon? Express your answer in joules.

$$E = h \nu \quad \cancel{6.9545 \times 10^{-19} \text{ J}}$$

$$E = h \nu = (1.3 \times 10^{15} \text{ s}^{-1})(h)$$

$$= \boxed{8.614 \times 10^{-19} \text{ J}}$$

B) How much kinetic energy does an emitted electron have in this case (in joules)?

$$E_k = 8.614 \times 10^{-19} \text{ J} - 6.9545 \times 10^{-19} \text{ J}$$

$$E_k = \boxed{1.659 \times 10^{-19} \text{ J}}$$

3) Carbon has three natural isotopes: Carbon-12, Carbon-13, and Carbon-14. What is the difference between these three isotopes?

These three isotopes all have different numbers of neutrons. C-12 has 6, C-13 has 7, and C-14 has 8. They also have different masses (12 g, 13 g, & 14 g respectively) & occur in varying frequencies w/ C-12 being the most abundant.