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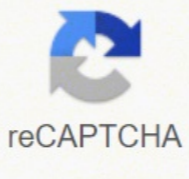
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Student Exploration: Nuclear Decay

Building DNA UPDATED HTML5

Construct a DNA molecule, examine its double-helix structure, and then go through the DNA replication process. Learn how each component fits into a DNA molecule, and see how a unique, self-replicating code can be created.

Lesson Info   Gizmo*

Lesson Materials

Time remaining to use this Gizmo: 1:37   Extend your pass.

Tools ▾

☑ Show hint

Drag and join nucleosides and phosphates to build the left side of the DNA molecule.

☑ Show nucleus

Release enzyme

Reset

Nucleosides

Phosphates

Chemistry 11 |KEY| Review Unit 6

6. Given the equation: $C_{12}H_{22}O_{11} + 12O_2 \rightarrow 12CO_2 + 11H_2O + 5638$ kJ

   a. How much heat is released during the formation of 9.6 moles of CO_2?

$$9.6 \text{ mol } CO_2 \times \frac{5638 \text{ kJ}}{12 \text{ mol } CO_2} =$$

Answer   (4510.4 kJ)

   b. How much heat is released during the formation of 0.036 moles of H_2O?

$$0.036 \text{ mol } H_2O \times \frac{5638 \text{ kJ}}{11 \text{ mol } H_2O} = 18.45 \text{ k}$$

Answer   (18.45 kJ)

   c. If 1026 grams of $C_{12}H_{22}O_{11}$ are consumed, how much heat is released?

$$1026 \text{ g } C_{12}H_{22}O_{11} \times \frac{1 \text{ mol}}{342.0 \text{ g}} = 3 \text{ mol } C_{12}H_{22}O_{11} \times \frac{5638 \text{ kJ}}{1 \text{ mol } C_{12}H_{22}O_{11}} = (16914 \text{ kJ})$$

Answer

   d. If 23.76 grams of CO_2 are produced, how much heat is released?

$$23.76 \text{ g } CO_2 \times \frac{1 \text{ mol } CO_2}{44.0 \text{ g } CO_2} = 0.54 \text{ mol } CO_2 \times \frac{5638 \text{ kJ}}{12 \text{ mol } CO_2} (253.71 \text{ kJ})$$

Answer

7. Calculate the amount of heat (in Joules) required to warm 350.0 g of water from 30°C to 35°C. (Heat Capacity (C) for H_2O is 4180 J/kg·°C)

$$\text{Heat} = m \cdot C \cdot \Delta t$$
$$= 0.350 \text{ kg} \times \frac{4180 \text{ J}}{\text{kg} \cdot \text{°C}} \times 5\text{°C} = (7315 \text{ J})$$

Answer

8. 35.112 kJ of heat are added to a 500.0 gram sample of water initially at 7°C. Calculate the final temperature of the water sample. Be careful with units!

$$\text{Heat} = m \cdot C \cdot \Delta t$$
$$35,112 \text{ J} = 0.500 \text{ kg} \times \frac{4180 \text{ J}}{\text{kg} \cdot \text{°C}} \times \Delta t \text{ °C}$$

$$t_{final} = t_{init} + \Delta t$$
$$t_{final} = 7 + 16.8 = 23.8°$$

Answer

$$\Delta t = \frac{35112}{(0.500)(4180)} = 16.8 \text{ °C}$$

$$M = \frac{DRT}{P}$$

$2H_2O \rightarrow 2H_2 + O_2$

3. How many liters of oxygen can be produced by the decomposition of 90.0 g of water? (Ans: 56.0 L)

$$\frac{90.0_g\,H_2O}{} \left| \frac{1.0\,mol\,H_2O}{18.0_g\,H_2O} \right| \frac{1.0\,mol\,O_2}{2.0\,mol\,H_2O} \right| \frac{22.4\,L\,O_2}{1\,mol\,O_2} = \boxed{56.0\,L\,O_2}$$

4. In the reaction between aluminum and oxygen, what mass of aluminum is needed to react with 500 L of oxygen? (Ans: 804 g)

$4Al + 3O_2 \rightarrow 2Al_2O_3$

$$\frac{500\,L\,O_2}{} \left| \frac{1.0\,mol\,O_2}{22.4\,L\,O_2} \right| \frac{4\,mol\,Al}{3\,mol\,O_2} \right| \frac{27.0\,g\,Al}{1\,mol\,Al} = \boxed{804\,g\,Al}$$

5. If excess chlorine reacts with a solution containing 20.0 g of potassium bromide, what volume of bromine gas is formed? (Ans: 1.90 L)

$Cl_2 + 2KBr \rightarrow Br_2 + 2KCl$

$$\frac{20.0_g\,KBr}{} \left| \frac{1.0\,mol\,KBr}{119.8\,g\,KBr} \right| \frac{mol\,Br_2}{2\,mol\,KBr} \right| \frac{22.4\,L}{1\,mol\,Br_2} = \boxed{1.88\,L\,Br_2}$$

6. Calcium carbonate decomposes at STP to form carbon dioxide and calcium oxide in the following balanced reaction: $CaCO_{3(s)} \rightarrow CO_{2(g)} + CaO_{(s)}$ How many grams of calcium carbonate will be needed to form 3.45 liters of carbon dioxide? (Ans: 2.16 g)

$CaCO_{3(s)} \rightarrow CO_{2(g)} + CaO_{(s)}$

$$\frac{3.45\,L\,CO_2}{} \left| \frac{1.0\,mol\,CO_2}{22.4\,L} \right| \frac{1\,mol\,CaCO_3}{1\,mol\,CO_2} \right| \frac{100\,g\,CaCO_3}{1\,mol\,CaCO_3} = \boxed{15.4\,g\,CaCO_3}$$
(40+12+48)

III. Gas Density

H_2S

1. What is the density of hydrogen sulfide gas at STP to three significant figures? (Ans: 1.52 g/L)

$$\frac{34.0_g\,H_2S}{1.0\,mol\,H_2S} \left| \frac{1\,mol\,H_2S}{22.4\,L} \right| = \boxed{1.52\,g/L}$$

2. What is the density of carbon dioxide at 745 mmHg and -5°C? (Ans: 1.96196 g/L)

$$D = \frac{MP}{RT} = \frac{\left(\frac{44\,g}{1.0\,mol}\right)\left(\frac{745\,mmHg}{1}\right)}{\left(62.4\,L\,mmHg\right)(268\,K)} = \boxed{1.96\,g\,CO_2}$$

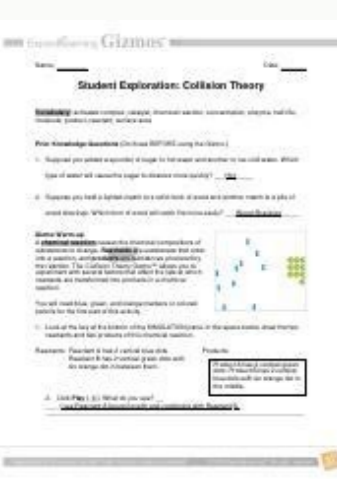3. Determine the molecular weight of a gas whose density if 1.84 g/L at 52°C and 600 torr. (Ans: 62.2 g/mol)

$$M = \left(\frac{1.84\,g}{L}\right)\left(\frac{62.4\,L\,mmHg}{mol}\right)\left(\frac{325\,K}{}\right) \cdot \frac{1}{600\,mmHg} = \boxed{62.2\,g}$$

4. Calculate the density of a gas at 27°C and 0.870 atm if its molecular weight is 34.1 g/mol. (Ans: 1.21 g/mol)

$$D = \frac{MP}{RT} = \frac{\left(\frac{34.1\,g}{mol}\right)\left(0.870\,atm\right)}{\left(0.0821\,\frac{L\,atm}{mol\,K}\right)(300\,K)} = \boxed{1.20\,g/L}$$

5. What is the density of argon gas, Ar, at a pressure of 551 torr and a temperature of 25°C? (Ans: 1.18 g/L)

$$D = \frac{MP}{RT} = \frac{\left(\frac{g}{mol}\right)\left(\frac{551\,mmHg}{1}\right)}{\left(\frac{62.4\,L\,mmHg}{mol\,K}\right)(298\,K)} = \boxed{1.18\,\frac{g}{L}}$$

Gizmos moles worksheet answers. Gizmos mole answer key. Gizmos moles answer key pdf.

We'll assume you're ok with this, but you can opt-out if you wish. If you don't seem to be making much progress, adjust the exponent using the Reproduction for educational use only. Even though you have the same number of each, would you expect them all to have the same mass? In the Moles Gizmo, you will learn about a unit used to count atoms. On the AVOGADRO CONSTANT tab, place the copper (Cu) atom on the nano-balance on the left, which will show the average atomic mass of copper rather than the mass of a single copper atom.1. What is the average mass of a copper atom?The unit "u" refers to unified atomic mass units. © 2020 ExploreLearning™ All rights reserved Accept Read More Student Exploration: MolesDirections: Follow the instructions to go through the simulation. © 2020 ExploreLearning™ All rights reserved These are the countries currently available for verification, with more to come! United States Canada Mexico American Samoa Guam Northern Mariana Islands Moldova Guernsey South Africa China Israel Japan South Korea Taiwan Australia New Zealand Argentina Brazil Chile Venezuela This website uses cookies to improve your experience. In the image to the right, note a dozen eggs, a dozen donuts and a dozen roses.How many of each item do you have?If there is a dozen of something you have 12 of an item.2. Would a dozen of each object have the same mass?No, a dozen of each item would not have the same mass because different objectshave different masses.3. Suppose you have a dozen carbon atoms, a dozen gold atoms, and a dozen iron atoms. Respond to the questions andprompts in the orange boxes.Vocabulary: atomic mass, Avogadro constant, conversion factor, dimensional analysis, mole, molar mass,molecular mass, scientific notation, significant figures, unified atomic mass unitPrior Knowledge Questions (Do these BEFORE using the Gizmo.)1. Explain.I would not expect them to all have the same mass, each individually weigh differently.Gizmo Warm-upWhen counting roses, eggs, or donuts, a dozen is a good unit to use. If you arecounting atoms, however, a dozen is not much help. How many atoms did you need to add?I had to add about 1*10^22 copper atoms to get 1.055g of copper.Reproduction for educational use only. A single proton or neutron has a mass of approximatelyone atomic mass unit. Different atoms have different massestherefore even if you have the same amount of a substance/atom/item they will nothave the same weight.Gizmo Warm-upWhen counting roses, eggs, or donuts, a dozen is a good unit to use. Explain.No, just like in the previous example just because there is the same amount of an itemdoesn't mean that they weigh the same. Thank you for your participation! Student Exploration: MolesDirections: Follow the instructions to go through the simulation. Public sharing or posting prohibited. To gain an idea as to how many atoms are in a gram or so of copper, use the larger balance on the right.Press Add atoms to put a scoop of atoms in the weighing dish, and keep adding until the balance registersbetween 1 and 2 grams. In the image to the right, note a dozen eggs, a dozen donuts and a dozen roses.How many of each item do you have?You have a dozen of each item, 12.2. Would a dozen of each object have the same mass?A dozen eggs would have a different mass than a dozen doughnuts.3. Suppose you have a dozen carbon atoms, a dozen gold atoms, and a dozen iron atoms. (Officially, 1 u is one-twelfth the mass of a C-12 atom.)2. In the Moles Gizmo, you will learnabout a unit used to count atoms.On the AVOGADRO CONSTANT tab, place the copper (Cu) atom on the nano-balanceon the left, which will show the average atomic mass of copper rather than the mass ofa single copper atom.1. What is the average mass of a copper atom?The average mass of a copper atom is 63.546 U.The unit "u" refers to unified atomic mass units. If you don't seem to be making much progress, adjust the exponent using theslider, which will make the scoop size bigger.

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