

Chapter 11 & 12 Study Guide: Motion & Forces Answer Key

Chapter 11: Motion

1. Define (include the formula and circle diagram for calculating speed, velocity, and acceleration):
 - a. Distance: The length between two objects or the length of the path traveled.
 - b. Speed: distance traveled by the time it took to travel. **speed = distance/time**
 - c. Velocity: distance traveled by the time it took to travel and the direction that you traveled in. **velocity = distance/time**
 - d. Acceleration: change in velocity or velocity over time. **acceleration = $\frac{velocity_{final} - velocity_{initial}}{time}$**
2. What is the speed of an object at rest? **0 m/s**
3. The difference between speed and velocity is that velocity includes **direction**.
4. The SI unit for distance is **meter (m)**.
5. The SI unit for speed or velocity is **meter per second (m/s)**.
6. The SI unit for acceleration is **meter per second squared (m/s²)**.
7. On a **distance-time** graph, what does the slope tell you? **Speed or Velocity**
8. On a **speed-time** graph, what does the slope tell you? **Acceleration**

Chapter 12: Forces

9. Describe (what does it say and what is it commonly called)
 - a. Newton's First law of Motion: **Also known as "Law of Inertia". Object in motion stays in motion and an object at rest stays at rest UNLESS acted upon by a NET FORCE.**
 - b. Newton's Second law of Motion: **$F = m \times a$. Force equals the product of an object's mass and acceleration. (Acceleration is equal to the force and inversely proportional to mass)**
 - c. Newton's Third law of Motion: **Also known as "Action/Reaction Law". For every action there is an equal and opposite reaction.**
10. Give **an example for each** of Newton's laws
 - a. Newton's First law of Motion: **boulder won't move unless something pushes on it, and the moon won't stop rotating unless a force acts on it.**
 - b. Newton's Second law of Motion: **it takes more force to accelerate a school bus than a toy car.**
 - c. Newton's Third law of Motion: **my foot pushed on the ball (action force), the ball pushes back (reaction force) and fly's forward (resulting net force). OR when you sit in the desk you push down on the desk and the desk pushes on you but they are balanced so there is NO CHANGE in motion.**
11. Define and give an example of each of the following terms.

Definition	Example
a. Friction: force that opposes motion.	a. Friction: heat when rubbing hands together.
b. Static Friction: friction that prevents object from moving.	b. Static Friction: pushing against a dresser that won't move.
c. Sliding Friction: friction that occurs between objects sliding past each other.	c. Sliding Friction: going down a slide; dresser sliding across the floor.
d. Rolling Friction: friction that occurs between object rolling against another object.	d. Rolling Friction: roller skates on pavement; car driving on the road
e. Fluid Friction: friction that occurs in a fluid (Examples of Fluid: water, quicksand, air.)	e. Fluid Friction: falling leaves; fish swimming in water

Physical Science Chapter 12 Forces And Motion

Wordwise Answers

Jessica J Manson



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for the nitration 4 01 ml of nitric acid 4 00 ml of sulfuric acid and 4 56 ml bromobenzene were used to complete the reaction with these measurements bromobenzene was found to be the limiting reagent since only 4 56 ml of bromobenzene was used the amount of product predicted to be recovered was 8 7533 g

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the aim of the experiment is to determine and study electrophilic aromatic substitution reaction eas particularly nitration of methyl benzoate go give methyl m nitrobenzoate thus determine the weight melting point and percentage yield of the pure methyl m nitrobenzoate abstract

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in this experiment we will carry out the nitration of bromobenzene bromine substituted on an aromatic ring is an ortho para directing group it will direct an incoming electrophile to the ortho and para positions it is also deactivating meaning that its reactions will be slower than the identical reactions of benzene

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section 20711 lab experiment nitration of bromobenzene introduction the chemical reaction of nitration consists of a nitro group being added to or substituted in a molecule nitration can basically be carried out by a mixture of concentrated nitric acid and sulfuric acid this mixture is useful to obtain the active nitronium ion

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1 go to the restroom and wash the affected area with lots of soap and water the soap in the lab is not suitable for this purpose 2 return to the lab and apply mineral oil to the affected area 3 the summary to this warning is not to touch any part of your body while performing this experiment if you must leave the lab for any reason 1

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in the nitration of bromobenzene a mixture of sulfuric acid and nitric acid react with one another nitric acid the weaker of the two acids will serve as base to form nitronium ion bromobenzene will attack the nitronium ion by nucleophilic attack

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then actual is your actual findings yield actual theoretical $\times 100$ what are the possible side reactions of nitration of bromobenzene dinitration can occur at ortho para or at both ortho positions occurs in overheating meta product happens very rarely because bromine is an ortho para director

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the soap in the lab is not suitable for this purpose 2 return to the lab and apply mineral oil to the affected area theory and explanation of the nitration of bromobenzene if the temperature of the reaction mixture exceeds 60 o

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the bromine substituent in bromobenzene is an ortho para director the para position is favored due to steric effects in the reaction that takes place in this lab a nitro group is substituted onto bromobenzene at the para position to form 1 bromo 4 nitrobenzene

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nitronium ion alone nitric acid is not a strong enough electrophile to react with bromobenzene sulfuric acid is added to the nitric acid the reverse rxn can overheat and boil easily includes a claisen adaptor and

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over 5 minutes slowly pipet this bromobenzene into the icy cold nitration mixture hno 3 h 2 so 4 in the 125 ml flask and stir continue to stir the reaction mixture in the ice bath for 30 minutes do not heat in a new 250 ml erlenmeyer

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on the right the arenium cation has a nitro set with incredibly small 0.6 angstrom bond distances this will result in an optimization failure as the atoms are even close for the programme to accomodate their electrons demonstration of creating the p arenium cation by to nitration of bromobenzene

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the purpose of this lab was to observe where substituents are added on a benzene ring by way of electrophilic aromatic substitution the electrophilic source in the nitration of bromobenzene comes from a nitronium ion no₂ which acts as the electrophilic species

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nitration of bromobenzene is an electrophilic aromatic substitution reaction the electrophile will be formed from 4.0ml of nitric acid and 4.0ml of sulfuric acid and will then react with 4.5ml of bromobenzene this will produce o bromonitrobenzene and p bromonitrobenzene

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chem 2261 lab 5 nitration of bromobenzene introduction an electrophilic aromatic substitution reaction is an important process that allows for intermediate chemical structures to be used as precursors to pharmaceuticals and other industrially produced chemicals by adding different functional groups into an aromatic ring

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lab report 10 nitration of bromobenzene raekwon filmore cm 244 section 40 march 27 2018 introduction for this experiment nitration of bromobenzene was the focus of the lab the benzene is an aromatic compound and when it reacts with wither a mixture of sulfuric acid or nitric acid creates what is known as a nitro group