**Answers to Chemistry Homework**


| **5.1 From Particles to Solutions p. 178 # 8,9,10** | |
|---|---|
| 8 | Pane of glass – solution<br>Chocolate chip ice cream – mechanical mixture<br>Clear apple juice – solution<br>Pizza – mechanical mixture<br>Garbage in garbage can – mech. Mixture |
| 9 | You need an alloy that heats up and liquefies quickly but also solidifies(sets) quickly. |
| 10 | Lead is toxic to humans. It can cause cancer. We are trying to remove it from many items. |

| **5.2 Physical Properties p. 182 # 1, 2, 3, 4 a-d** | |
|---|---|
| 1 | <u>Qualitative property</u> describes the quality. It is a descriptive observation that uses the 5 sense. ie: it was red. A <u>quantitative property</u> describes the quantity – the number. These are measured observations so they always include a number ie: length is 5 cm. |
| 2 | a) colour is qualitative property<br>b) 60 cm - quantitative property<br>c) qualitative<br>d) quantitative (#) |
| 3 | Mountain bikes –<br>• strong – should be able to go over bumps and not break<br>• light weight – you need to power it so heavier is harder. Also you may need to lift it once in a while<br>• anything else? |
| 4 a-d | → Remember: colour and state are always 2 properties you can list fairly easily<br>a) Copper wire – ductile (make into wire), flexible (wires aren't always straight), metallic lustry (shiny), thin (wires are not usually very thick<br>b) 500 g of butter – yellow, solid, soft, smooth<br>c) glass of milk – liquid state, low viscosity, opaque (can't see through), has little or no smell, white<br>d) candle – flammable (it burns), solid, soft (can easily scratch it), dull (most often it is not shiny) |

| **5.3 Chemical Properties p. 186 # 1-7** | |
|---|---|
| 1 | A physical change does not change the substance. If I cut up paper, it is smaller but it is still paper. That is a physical change. A chemical change indicates that the substance has changed. If I burn paper, it is no longer paper. It has become ash or soot. That is a chemical change. |
| 2 | Water freezing is not a chemical change – it did not stop being water. It just went from being liquid water to solid water. Water freezing is a physical change. |
| 3 | • Metallic lustre – <u>physical property</u> – it describes how metal looks. It is still metal.<br>• Boiling point – <u>physical property</u> – it describes the temperature at which the substance changes state from liquid to gas. All state changes are physical properties.<br>• Explodes when ignited – <u>chemical property</u> – when something it explodes, it changes. It is no longer the same substance. Explosion is not a state change.<br>• changes colour when mixed with water – I don't like this clue – ask me why in class. |
| 4 | • water boiling – physical change – water has just changed state – it is still water<br>• wood is sawed / made into box – physical change – it is still wood but a different shape. |

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| | • firewood burns and ash remains – chemical change – clue? Change of colour. Also…ash is NOT wood – the substance has changed.<br>• sugar, ewggs and flour are mixed and baked into cookies. – chemical change – baking is a chemical change. Clue? Smell – odour (lovely smell) is given off. Colour change – baked cookies have 'browned'. |
| 5 | Glow sticks give off light – that is a clue that chemical change has occurred. |
| 6 | a) Physical change – liquid wax changes back to solid wax (drips on side) but also solid wax turning into liquid wax (pool of liquid wax below flame)<br>b) Why shorter? The wax is burning and thus being used up. The burning process has chemically changed the wax to gas (carbon dioxide)<br>c) heat and light is given off by the candle. These are clues that a chemical change has occurred. |
| 7 | Clues that a chemical change has occurred:<br>a) start the car – the engine heats up & smoke (gas – a new substance) is released from tailpipe<br>b) remove stain – stain is one colour and afterwards it is gone . This is a colour change.<br>c) baking sode & lemon juice – bubbles mean a new gas has formed. This is a new substance.<br>d) baking cookies – smell is a new substance (gas)<br>e) match ignites – smoke & light produced.<br>f) bleached towel – towel was red and then turned white. Colour change indicates a chemical change<br>g) sweeter banana – sweeter taste means there is more fruit sugar – it is being produced during the ripening process. New substance produced means a chemical change. |

| **5.6 Characteristic Physical Properties p. 198 # 3, 4, 7, 10, 12** | |
|---|---|
| 3 | When silver solidifies, the particles move closer together and thus it becomes denser. Solid silver would sink in liquid silver. |
| 4 | Remember to look up specific densities in the chart on page #193<br>Volume = $\frac{mass}{density}$ Volume = $\frac{5.00g}{7.87g/cm3}$ = 0.64 $cm^3$ |
| 7 | Remember that 1.0 kg = 1000g<br>Density = $\frac{mass}{volume}$ Density = $\frac{1000g}{370cm3}$ = 2.7 $g/cm^3$ This is aluminum |
| 10 | Volume = length x width x height<br>Volume = 18.00 cm x 9.21 cm x 4.45 cm = 737.7 $cm^3$ Density gold = 19.32 $g/cm^3$<br>Mass = Volume x Density = 737.7 ~~$cm^3$~~ x 19.32 g/~~$cm^3$~~ = 14,252 g = **14.2 kg of gold** |
| 12 | Known densities<br>Alcohol = 0.79 g/mL water = 1.0 g/mL ice = 0.92 g/mL<br>If I have a liquid that is either alcohol or water, I would put an ice cube in it. The ice cube will float in water but it will sink in alcohol. |

| **6.1 Periodic Table p. 215 # 1, 3, 5, 8, 9** | |
|---|---|
| 1 | If it's on the periodic table it is an element. If it is NOT on the periodic table, then it is NOT an element. Is it an element?<br>Bronze – no (metal alloy)<br>Tin – yes |

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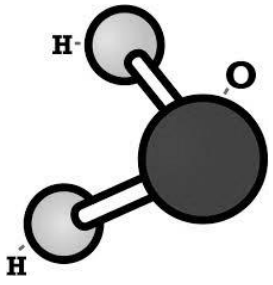
|---|---|---|
| | Chromium – yes<br>Solder – no (usually a metal alloy)<br>Propane – no<br>Arsenic – yes<br>Nickel – yes | |
| 3 | If a white powder becomes a gas and a black solid, then it is breaking down into simpler components. It was heated and not burned. It simply broke down into simpler parts so it is NOT an element. Elements are the simplest that matter gets. They are the building blocks of matter | |
| 5 | There are more metallic elements on the periodic table. | |
| 8 | Metals<br>•conducts electricity<br>• can be flattened with hammer = malleable which means a metal. Non-metals are brittle<br>• 1st column = left side = metal | Non-metals<br>• gas normally (metals are normally solid)<br>• upper right of table is always non-metals<br>• shatters – this is brittle so = non- metal<br>• dull yellow – dull (not shiny) and yellow (not grey or gold) is a non-metals |
| 9 | a) Copper and aluminum are metals so they conduct heat. This is helpful for cooking because you want the heat from the stove element to transfer to food. These metals do just that.<br><br>b) silver and gold – are shiny (have a lustre) which makes them pretty for jewelry. They are somewhat malleable so they can be shaped into rings or bracelets etc. They are solids because our jewellry cannot be liquid or gas.<br><br>c) argon in double-glazed windows – this helps insulate your house. Argon is a non-metal and does NOT conduct heat well (thermal energy). So this prevents your heat from your house leaving to the outside which is a good thing. You want the heat to stay inside. | |

| **6.4 Patterns in Periodic Table p. 225# 1, 2, 3, 4, 6, 8,** | |
|---|---|
| 1 | a) False – elements in the same vertical columns are in the same family<br>b) true (properties are similar. Not sure I would say 'same')<br>c) true<br>d) true |
| 2 | Chlorine – Halogens<br>Magnesium – alkali earth metals<br>Potassium – alkali metals<br>Helium – noble gases |
| 3 | Elements in the 1st and 2nd column all end in 'ium' except for Hydrogen. Hydrogen really is an element all on its own so that makes sense. |
| 4 | Sodium is highly reactive with water so its not a good idea to have it in wiring. What if the wires got damp? They would catch on fire! (hopefully you were in class when I did this demo). |
| 6 | Hydrogen is a gas which means it should be on the non-metal side of the period table. It would make sense to put it in the Halogens since they are very reactive and hydrogen is very reactive. |
| 8 | Alkali metals are rarely found in pure form because they are so reactive. When they are with other substances they would just react and chemically change and thus are no longer that pure alkali metal element. ie: Na reacts with Cl and becomes NaCl (salt) and thus is not pure Na any longer. |

| **6.6 Atomic Theories p. 233 # 2, 3, 5** | |
|---|---|
| 2 | J.J. Thomson's experiment – electron ray with Cathode Ray Tube<br>a) Particles are negative because they were always attracted to a positive plate<br>b) these particles are now called 'electrons'<br>c) Thomson concluded these electrons are evenly distributed throughout the atom<br>d) the atom is neutral so there must also be positive particles inside the atom. (otherwise atoms would all be negatively charged and not neutral).<br>e) Thomson figured the positive particles were also evenly mixed in atom<br><br>'Plum pudding' model…or today we would say…"chocolate chip cookie' model. The dough would be the positive particles and the chocolate chips would be the electrons. |
| 3 | If a neutral atoms has 3 electrons, it must also have 3 protons so the whole atom has no charge (neutral) |
| 5 | Rutherford's gold foil experiment<br><br>a) Rutherford expected that these small particles would blast through the gold foil.<br>b) The results surpised him because some of the alpha particles deflected and did not go straight through. A small number even deflected backwards!<br>c) Rutherford determined that there must be a small dense Positive core in the atom which he called the nucleus.<br>d) These positive particles must all be in the small dense core (nucleus) |
| | |
| **6.7 Bohr-Rutherford Models p. 240 # 1, 2, 3, 9** | |
| 1 | Yes, all atoms of the same element contain the same number of protons. That is because the # of protons actually determines which element you have. If the number of protons change, then you have a different element. ie: Carbon has 6 protons and only 6. If it has 5 protons, then it is no longer carbon, it is boron. |
| 2 | All atoms of the same element do NOT always have the same number of neutrons. Neutrons do NOT determine which element it is. They add mass though. The mass number given on the periodic table is the average mass of an atom of a particular element. |
| 3 | a) true<br>b) false – the atomic mass (# p + # n) is always larger than the atomic number (# p only)<br>c) normally false. But if a hydrogen has only 1 proton & 1 electron and NO neutrons, then the atomic number = 1 and the atomic mass = 1. This is the only situation I can think of in which atomic mass = atomic number.<br>d) false - # protons does not have to equal # neutrons. Often doesn't<br>e) true – if the atom has a neutral charge<br>f) true! |
| 9 | # electrons in outer orbit (valence electrons) does seem to determine the reactivity of the element. For example, we looked at alkali metals (Na, Li and K) They all reacted quickly with water and they all have just 1 electron in their outer orbit. Also, halogens are known to very reactive and they all have 1 electron short of a full outer orbit. Elements in the middle of the periodic table are not so reactive and they are outer orbits that are typically closer to half filled. |



| **7.1 Introduction to Molecules p. 261 # 1-9** | |
|---|---|
| 1 | a) 4 elements<br>b) Na – 1 H – 1 C – 1 O – 3<br>c) all elements are non-metals except Na |
| 2 | a) Elements → $S^8$ , Ne, $H_2$<br>b) Compounds → $CO_2$ $C_3H_8$<br>c) atoms → Ne<br>d) molecules → all are molecules except Ne |
| 3 | Diatomic means 2 atoms. ie: $O_2$ |
| 4 | There are 7 diatomic molecules. Remember HOFBrINCl? There are 7 elemental symbols in there. Each of these 7 elements form a diatomic (2 atom) molecule. |
| 5 | Hydrocarbon is a good name because each molecule contains carbon and hydrogen (hydro-). The only difference is the number of carbons & hydrogens. *would be good to put a few examples in your notebook right here* |
| 6 | a) An atom has a neutral charge whereas an ion has a charge (either +ve or –ve)<br>b) An easy atom to draw with a BR diagram is Lithium (Li). It will have 2 electrons in the inner orbit and only 1 in the outer orbit. There will be 3 protons in the nucleus so the atom is neutral.<br><br>A lithium ion will still have 3 protons in the nucleus but will only have 2 electrons in the outer orbit. It will lose/give away that single electron in the outer orbit. This give the lithium atom a +1 charge and it is not an ion. |
| 7 | a) ammonia $NH_3$<br>b) carbon dioxide $CO_2$<br>c) carbon monoxide CO<br>d) water $H_2O$<br>e) rubbing alcohol $C_3H_8O$ |
| 8 | Calcium forms a +2 ion.<br>• See me if you can't see why |
| 9 | $Ca^{+2}$ |

| **7.3 How Atoms Combine p. 266 # 1-4, 7** | |
|---|---|
| 1 | a) 14 parts gold + 10 parts copper = 24 parts (24 karat actually!) 14/24 x 100% = 58% gold<br>b) metals + metals do NOT form compounds. The atoms are not chemically bonded together. They for a solid solutions or an **alloy**.<br>c) 14K gold in jewelry is not pure gold. It looks like pure gold but it is only 58% gold. The copper (or other metals) are added to make gold stronger/harder. This is desirable in jewellery because we don't want our gold jewellery to break or wear away quickly. |
| 2 | An alloy is a solid solution. It is a mixture just like salt water and just like salt water you cannot see the different parts. When you have a solution in which you cannot see the parts, you call in a solution! (A solid solution is often called an alloy though). |
| 3 | Sodium hydroxide = NaOH<br>$O_3$ = ozone<br>Sodium chloride = table salt<br>$CO_2$ = carbon dioxide<br>Sodium hydrogen carbonate = baking soda<br>Calcium carbonate = limestone/chalk |
| 4 | Muriatic acid = HCl |

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|---|---|
| | Vinegar = $C_2H_4O_2$<br>Potash = KCl<br>Quicklime = CaO<br>Milk of magnesia = $Mg(OH)_2$<br>Natural gas = $CH_4$ |
| 7 | An ionic compounds involves metals + non-metals. Metals give away electrons and become +ve ions. Non-metals take electrons and become –ve ions. The +ve and –ve are attracted to each other often forming a crystal. There is NO chemical bond.<br><br>A molecule involves a chemical bond. Chemical bonds are formed between a non-metal and a non-metal (covalent or sharing bond). Both non-metals wish to gain electrons to they simply share the electrons they need. This IS a chemical bond. |