Notes for teachers:

This game involves knowledge of the subject as well as the roll of the die (for lucky but unknowledgeable students!)

You will need:

One six-sided die

The knowledge cards printed (double-sided) and cut into individual cards

A card holder is handy

This is my own invention: Dr. Vikki French, 2017

Enjoy!

**The Atoms Game**

It’s about atoms and chemistry

To play:

When it is your turn, choose an “Atoms Game” card from the stack

Hand it to the person to your right

That person will read the card’s question for you to answer

If you get the answer right, keep the card

If you get the answer wrong, put the card in the dump and roll the die:

If you get: a 5 or 6 – you get 1 point

a 3 or 4 – 0 points

a 1 or 2 – you lose 1 point

At the end of the game:

Everyone calculates their points:

2 points for every card you answered correctly plus your dice points

The person with the most points wins

**My total points were: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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|  | Which of these choices is not a major part of an atom?  Electrons  Protons  Neutrons  **All are parts of an atom** |  |  | An isotope is a form of an atom with a different number of...  Electrons  Protons  **Neutrons**  All of the Above |  |  | The atomic number of an element tells you the number of \_\_\_\_\_\_\_\_\_\_\_ in a neutral atom  Electrons and Neutrons  **Electrons and Protons**  Protons and Neutrons |
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|  | An ion is a form of an atom with a different number of...  **Electrons**  Protons  Neutrons  All of the Above |  |  | Which of these particles is found in the atomic nucleus?  Electrons and Neutrons  Electrons and Protons  **Protons and Neutrons** |  |  | Which scientist is NOT associated with the study of atomic structure?  Niels Bohr  Ernest Rutherford  **Michael Faraday**  All of these scientists worked with atomic structure |
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|  | All electrons orbit the nucleus in regions shaped like spheres  True  **False** |  |  | Scientists use spectroscopy to identify elements  **True**  False |  |  | You cannot know the exact location of an electron  **True**  False |
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|  | Atoms in the same families of elements share similar characteristics  **True**  False |  |  | Which of these is NOT a basic piece of an atom?  Electron  **Quanton**  Proton  Neutron |  |  | Which atomic particle has a negative charge?  **Electron**  Proton  Neutron  None of the Above |
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|  | An electron has a mass that is much less than a proton  **True**  False |  |  | An electron can only stay in one of the seven possible atomic shells  True  **False** |  |  | An atom with a neutral charge has the same number of...  Protons and Neutrons  Neutrons and Electrons  **Protons and Electrons** |
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|  | There is no particle of matter smaller than an atom  True  **False** |  |  | Atoms of an element may have more or fewer neutrons or electrons than other atoms of the same element.  **True**  False |  |  | The innermost atomic shell can hold a maximum of 18 electrons  True  **False**  **(only 2)** |
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|  | When atoms bond with each other, they exchange...  Protons  Neutrons  **Electrons** |  |  | How many protons in a Hydrogen (H) atom?  **One**  Two  Three  Four |  |  | How many neutrons in a Hydrogen (H) atom?  **Zero**  One  Two  Three |
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|  | If an atom has 13 electrons, how many shells will it have?  One  Two  **Three**  Four  (max 2 in 1st shell  max 8 in 2nd shell  max 8 in 3rd shell) |  |  | What is the name of the compound NaCl?  Hydrogen bromide  Potassium chloride  Sodium dichloride  Sodium chloride |  |  | If you pour liquid nitrogen into a glass at room temperature, it will change its physical state to a solid  True  **False** |
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|  | How many electrons in a Hydrogen (H) atom?  **One**  Two  Three  Four |  |  | Plasmas are all made of the same ions.  They have different colors due to different amounts of electricity.  True  **False**  (The color of plasma depends on what elements are being charged and ionized) |  |  | Name a force that keeps molecules together  Friendship  Detraction  **Attraction**  Phlegmatic |
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|  | Which is an example of a crystal lattice?  Plastic  **Diamond**  Cement  Sand |  |  | Atoms in a liquid are farther apart than the atoms in a gas  True  **False** |  |  | Which has the least energetic molecules?  **Solids**  Liquids  Gases  Plasmas |
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|  | What force pulls liquids towards the ground?  Pressure  Temperature  **Gravity**  Centrifugal |  |  | When a substance goes from being a solid to a liquid, it is a...  Chemical Change  **Physical Change** |  |  | If one substance combines with another to make a new compound, it is a ...  **Chemical Change**  Physical Change |
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|  | You may find plasma in a star  **True**  False  (Plasma is what makes a star a star) |  |  | Which of these choices will NOT change the state of matter?  Temperature  **Crushing a Crystal**  Pressure  Electricity |  |  | If you leave water in a glass and some molecules turn into a gas, it is called...  Egasoration  **Evaporation**  Extinction  Solidification |
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|  | Which of these choices is NOT an example of a plasma?  Aurora Borealis  Fluorescent Light Bulb  Neon Sign  **Incandescent Light Bulb** |  |  | What is usually the total charge of a plasma?  Positive  Negative  **Neutral** |  |  | Mixtures are always combinations of compounds that are in different states of matter  True  **False** |
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|  | You can separate all mixtures by filtration  True  **False** |  |  | Would it be possible to have a mixture made of all carbon atoms and compounds with only carbon atoms?  **Yes**  No  Ex: mix coal, graphite, and diamonds |  |  | Mixtures are generally separated by what methods?  Chemical  **Physical** |
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|  | Only specific compounds can be combined to form mixtures  True  **False** |  |  | All solutions are mixtures, but not all mixtures are solutions  **True**  False  (Solutions are liquid, mixtures can be any phase of matter) |  |  | As the temperature of a mixture increases, one part of the mixture may melt while the other parts remain solid.  **True**  False |
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|  | Which of these is not a mixture?  Solution  Alloy  Amalgam  **They are all mixtures** |  |  | Which of these is not a mixture?  Oil and Water  Sand and Soda  Diet Soda  **All are mixtures** |  |  | Which of these is a solution?  14K Gold  Salt Water  Carbonated Water  **All of the Above**  (Gold starts as a  molten mixture) |
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|  | Solutions with low concentrations of solutes are...  Concentrated  **Dilute**  Solvents  None of the Above |  |  | Colloids are solutions with very small particles suspended in a liquid  **True**  False |  |  | The concentration of solutions is directly related to...  Solubility  Temperature  Pressure  **All of the Above** |
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|  | The most common solvent on Earth is...  Gasoline  **Water**  Turpentine  None of the Above |  |  | All liquids can be mixed to create solutions  True  **False** |  |  | An increase in pressure can lead to an increase in dissolved gases  **True**  False |
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|  | You can remove salts from a water-based solution by using the process of...  **Evaporation**  Condensation  Quantification |  |  | A positively charged ion is called a…  Dogion  **Cation**  Neutrion  None of the Above |  |  | An aqueous solution is one that has compounds dissolved in water  **True**  False |
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|  | Liquids and gases expand as the temperature increases  **True**  False |  |  | If Isaac Newton was the father of classical mechanics, who would be the father of relativity?  Isaac Newton  **Albert Einstein**  Johann Kepler  Charles Darwin |  |  | Fusion breaks atoms apart for energy  True  **False**  (That would be fission…) |
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|  | In Einstein’s famous equation, e =?  ma  **mc2**  mc |  |  | What are the basic pieces of an atom?  Electron, Positron, Nucleon  Neutron, Positron, Electron  **Proton, Neutron, Electron**  Neutral, Positive, Negative |  |  | If you looked at an atom of antimatter, the small particles orbiting the nucleus would have a \_\_\_\_\_\_ charge  **Positive**  Negative  Neutral |
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|  | Radioactive isotopes can give off what types of radiation?  Alpha Particles  Beta Particles  Gamma Rays  **All of the Above** |  |  | Nuclear fission uses hydrogen to generate energy  True  **False**  (That would be fusion…) |  |  | Gravitational forces are one of the accepted four fundamental forces of the Universe  **True**  False |
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|  | Half-life is the amount of time it takes for \_\_\_\_\_\_\_\_ of the atoms of a radioactive sample to decay  One-quarter  **One-half**  One-third |  |  | An element is determined by the number of:    atoms    electrons    neutrons    **protons** |  |  | A single proton has what electrical charge?    no charge    **positive charge**    negative charge    either a positive or negative charge |
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|  | Which particles have approximately the same size and mass as each other?  neutrons and electrons    electrons and protons    **protons and neutrons**    none - they are all very different in size and mass |  |  | Which two particles would be attracted to each other?    electrons and neutrons    **electrons and protons**    protons and neutrons    all particles are attracted to each other |  |  | The atomic number of an atom is:    the number of electrons    the number of neutrons    **the number of protons**    the number of protons plus the number of neutrons |
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|  | What is the atomic number of a Cl atom which has 17 protons and 18 neutrons?    **17**    18    35 |  |  | An atom has 7 protons and a mass number of 14. What is the number of neutrons in this atom?    **7**    14    21 |  |  | An atom as a whole is \_\_\_\_\_\_\_    **electrically neutral**    positively charged    negatively charged |
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|  | The mass number of an atom is the sum of the numbers of the \_\_\_\_\_\_\_  **protons and neutrons**  electrons and protons  neutrons and protons |  |  | The atoms in an element are:  **All the same type**    Two types joined together    About a hundred different types |  |  | The center of the atom is the  **nucleus**  proton  neutron  electron |
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|  | The smallest particle of an element to still be that element is the  nucleus  electron  **atom**  neutron |  |  | How many total atoms are in a molecule of water (H2O)?  1  2  **3** |  |  | How many different types of atoms are in a molecule of water (H2O)?  1  **2**  **3** |
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|  | Which of these is the smallest particle?  **an atom**    a molecule    a speck of dust |  |  | Which statement about elements is correct?  **most elements are metals**  most elements are non-metals    there are about the same number of metals and non-metals |  |  | Which of the following is not a general property of metals?  shiny  good conductor of heat    **poor conductor of electricity** |
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|  | Which of the following is not a general property of non-metals?    brittle  **strong**    poor conductor of heat |  |  | An element sinks in water and makes ringing sound when hit. It is most likely to be:  **a metal**    a non-metal    an alloy |  |  | A hydrogen atom does not contain:  a proton  **a neutron**  an electron  a hydrogen atom has all of these |
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|  | Which atom has the smallest atomic weight?    oxygen  **hydrogen**    carbon    none of the above |  |  | Subatomic particles are found inside atoms  **true**  false |  |  | The modern periodic table is organized by atomic number \_\_\_\_  **Increasing**    Decreasing    Reducing    Developing |
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|  | Which of these changes is a chemical change?  **iron rusting**    crushing a crystal    ice melting |  |  | Which of these changes is a chemical change?  crushing ore  **gasoline burning**    water evaporating |  |  | An electron can only stay in one of the seven possible atomic shells  True  **False** |
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|  | The innermost atomic shell can hold a maximum of 18 electrons  True  **False**  **(only 2)** |  |  | Which of these is a chemical suspension:  Salt water  **Snow globe**  Raisin bran  Water  Mayonnaise |  |  | Which of these is a colloid:  Salt water  Snow globe  Raisin bran  Water  **Mayonnaise** |
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|  | Which of these is a chemical mixture:  Salt water  Snow globe  **Raisin bran**  Water  Mayonnaise |  |  | Which of these is a chemical solution:  **Salt water**  Snow globe  Raisin bran  Water  Mayonnaise |  |  | Which of these is a chemical compound:  Salt water  Snow globe  Raisin bran  **Water**  Mayonnaise |
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