Science Trek open

(music)

Joan Cartan-Hansen, Host: A COMPOUND IS A SUBSTANCE MADE UP OF DIFFERENT ELEMENTS.

AN ELEMENT IS SOMETHING THAT CAN’T BE BROKEN DOWN INTO A SIMPLER SUBSTANCE.

WE LIST ELEMENTS ON THE PERIODIC TABLE.

WHEN YOU COMBINE ELEMENTS, LIKE ONE ATOM OF HYDROGEN AND TWO ATOMS OF OXYGEN, YOU CAN GET H2O OR WATER.

BUT IF YOU COMBINE TWO ATOMS OF HYDROGEN AND TWO ATOMS OF OXYGEN, YOU GET HYDROGEN PEROXIDE, SOMETHING USED TO BLEACH THINGS AND SOMETHING YOU definitely SHOULDN’T DRINK.

THEY’RE BOTH COMPOUNDS, BOTH MADE UP THE SAME ELEMENTS, BUT VERY DIFFERENT SUBSTANCES.

THE STUDY OF ELEMENTS AND COMPOUNDS IS A BIG PART OF THE SCIENCE OF CHEMISTRY.

CHEMISTS LEARN HOW TO COMBINE ELEMENTS AND TO TAKE APART COMPOUNDS.

THEY LEARN WHAT SUBSTANCES ARE MADE OF AND HOW ELEMENTS COMBINE TO MAKE NEW MATERIALS.

THEY ALSO LEARN ABOUT PROPERTIES.

EVERY SUBSTANCE HAS A UNIQUE SET OF PROPERTIES.

PHYSICAL PROPERTIES ARE SOMETHING YOU CAN SEE OR MEASURE.

LOOK AT THE PUPPIES. THEY ARE ALSO SOFT AND COLORFUL AND WEIGH A FEW POUNDS.

COLOR, TEXTURE, AND WEIGHT ARE SOME OF THE PHYSICAL PROPERTIES OF THE PUPPIES.

(AWE)

BUT SCIENTISTS ARE ALSO INTERESTED IN A SUBSTANCE’S CHEMICAL PROPERTIES.

CHEMICAL PROPERTIES ARE HOW A SUBSTANCE ACTS UNDER CERTAIN CONDITIONS.

YOU CAN SEE A SUBSTANCE’S CHEMICAL PROPERTIES ONLY THROUGH A CHEMICAL REACTION.

AND IF YOU KNOW WHAT A SUBSTANCE’S CHEMICAL PROPERTIES ARE, YOU CAN CLASSIFY IT, IDENTIFY IT IN AN UNKNOWN SOLUTION, PREDICT HOW IT WILL BEHAVE, AND FIGURE OUT HOW TO SEPARATE IT OUT.

THIS IS MY FRIEND CHRIS SAUNDERS.

HE’S A CLINICAL ASSISTANT PROFESSOR AT BOISE STATE UNIVERSITY’S DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY.

HE’S GOING TO SHOW US HOW YOU CAN BREAK UP A COMPOUND INTO ITS COMPONENTS.

CHRIS SAUNDERS, CHEMIST: WELL OFTEN TIMES THAT’S PRETTY DIFFICULT TO DO. BUT ONE OF THE EASY ONES THAT WE CAN DO IS THE ELECTROLYSIS OF WATER. SO WHAT I HAVE HERE IS A SET UP WHERE I’VE TAKEN WATER AND I’M PASSING AN ELECTRIC CURRENT THROUGH THE WATER. SO WHAT’S COLLECTING IN THESE TUBES IS HYDROGEN GAS AND OXYGEN GAS. AND YOU’LL NOTICE THERE ARE DIFFERENT AMOUNTS OF GAS IN THAT TUBE BECAUSE WATER IS MADE OUT OF TWO PARTS OF HYDROGEN TO EVERY ONE PART OF OXYGEN. WE CAN ALSO LOOK AT THE DIFFERENT CHEMICAL PROPERTIES OF HYDROGEN GAS VERSUS OXYGEN GAS. ONE OF THEM BEING THAT HYDROGEN GAS MAKES A NICE POP WHEN YOU IGNITE IT. SO WE ARE GOING TO TRY TO CATCH THAT GAS AND TOUCH A FLAME TO IT AND SEE WHAT HAPPENS SO LISTEN CAREFULLY.

(POP)

SAUNDERS: NOT MUCH OF AN EXPLOSION, BUT YOU COULD DEFINETLY HEAR THAT THERE WAS AN IGNITION OF THE HYDROGEN GAS. NOW IF WE DO THAT SAME THING WITH THE OXYGEN GAS WE ARE GOING TO GET A DIFFERENT RESULT.

SEE NO EXPLOSION THIS TIME.

(music)

SAUNDERS: SO I HAVE SOME SOLUTIONS HERE THAT I’VE MADE UP AND WE ARE GOING TO MIX THEM TOGETHER AND WE ARE GOING TO MAKE OBSERVATIONS IN TERMS OF HAS A CHEMICAL CHANGE HAPPENED? I.E. HAVE WE MADE SOMETHING NEW? IN THIS CASE WE HAVE A SOLUTION OF POTASSIUM IODIDE AND IN THIS SOLUTION WE HAVE LEAD NITRATE. SO WE ARE GOING TO MIX THESE TWO TOGETHER. BOTH OF THEM START OFF AS CLEAR COLORLESS LIQUIDS AND WHEN I ADD THEM TOGETHER OBVIOUSLY SOMETHING NEW IS BEING MADE. IN THIS CASE THAT BRIGHT YELLOW PRECIPITATE IS LEAD IODIDE. NOW YOU NOTICE WHEN I MIX THESE TWO SOLIDS TOGETHER THAT NOTHING IS HAPPENING. WHEN WE MIXED THEM BEFORE THEY MADE THAT YELLOW PRECIPITATE SO WHAT’S GOING ON? WELL FOR THIS REACTION TO OCCUR THEY BOTH NEED TO BE DISSOLVED IN WATER. SO LET’S ADD SOME WATER TO THEM AND SEE WHAT HAPPENS.

SO RIGHT AWAY YOU CAN SEE AS WE ADD THAT WATER THOSE COMPOUNDS WILL DISSOLVE AND NOW THEY CAN REACT WITH EACH OTHER SO THAT WE MAKE THE SAME YELLOW COMPOUND THAT WE MADE IN THE FIRST REACTION.

(music)

SAUNDERS: SO RIGHT HERE I HAVE A BALANCE AND WE USE A BALANCE TO MEASURE THE MASS OF COMPOUNDS. AND ON THE BALANCE I HAVE A CONTAINER OF VINEGAR AND I HAVE A BALLOON. INSIDE THE BALLOON I PLACED SOME BAKING SODA AND WHEN YOU MIX BAKING SODA AND VINEGAR TOGETHER YOU GET A REACTION. SO I’M GOING TO MIX THESE THINGS TOGETHER, KEEP THEM ON THE BALANCE AND WE’RE GOING TO SEE WHAT HAPPENS TO THE MASS.

NOW IT’S IMPORTANT TO NOTE THAT ONE OF THE PRODUCTS OF THIS REACTION IS A GAS SO I NEED TO KEEP THE BALLON ON HERE SO THAT I CAN CATCH ALL OF THAT GAS BECAUSE EVEN THOUGH IT’S VERY LIGHT GAS HAS MASS AS WELL.

OH THAT’S GOING TO MAKE A MESS!

SO OUR REACTION HAS HAPPENED. DEFINETLY THINGS HAVE CHANGED. WE SAW A LOT OF ALL THIS BUBBLING, WE’VE CAUGHT ALL THAT GAS, BUT EVEN AFTER ALL OF THAT THE MASS OF ALL THE PARTS OF OUR REACTION HAVE NOT CHANGED.

CARTAN-HANSEN: THANKS CHRIS FOR SHOWING US ABOUT COMPOUNDS.

Chris: My pleasure THANKS FOR HAVING ME JOAN.

CARTAN-HANSEN: IF YOU WANT TO LEARN MORE ABOUT COMPOUNDS AND LOTS OF OTHER SCIENTIFIC TOPICS, CHECK OUT THE SCIENCE TREK WEB SITE.

YOU’LL FIND IT AT IDAHOPTV.ORG/SCIENCE TREK.

(music)

Narrator: Presentation of Science Trek on Idaho Public Television is made possible through the generous support of the Laura Moore Cunningham Foundation, committed to fulfilling the Moore and Bettis Family legacy of building the great state of Idaho; by the Idaho National Laboratory, mentoring talent and finding solutions for energy and security challenges; BY WALMART AND THE WALMART FOUNDATION, INCREASING ACCESS FOR IDAHO’S CHILDREN TO EXPLORE THE POSSIBILITIES OF SCIENCE AND TECHNOLOGY AND SPARKING THEIR INTEREST IN CAREERS THAT SHAPE OUR WORLD; by the Friends of Idaho Public Television; by the Corporation for Public Broadcasting AND BY VIEWERS LIKE YOU, THANK YOU.