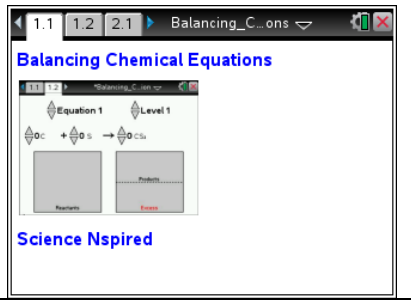
Balancing Chemical Equations
Student Activity

Name _____

Class _____

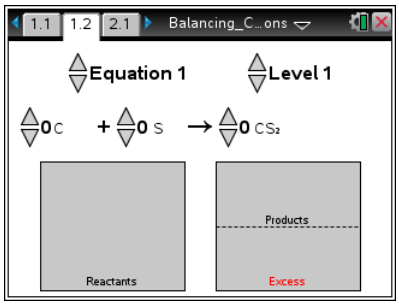
Open the TI-Nspire document
Balancing_Chemical_Equations.tns.

In this activity you will use the simulation to generate chemical equations and to balance these equations by observing how products are formed from reactants. You will be able to adjust coefficients for the reactants until all reactants are used to form the products.



Move to page 1.2.

Press ctrl ▶ and ctrl ◀ to navigate through the lesson.



1. Review the directions for this part of the activity. You can close the Directions box by clicking ☒. You can also view the directions again by pressing menu.

   In this activity, you will explore balancing chemical equations for various types of equations:

   Level 1 – combination equations
   Level 2 – single replacement equations
   Level 3 – double replacement equations

2. Start with Equation 1 in Level 1. Use the up and down arrows to change the coefficients that appear in front of each reactant until product is formed without any excess.

Answer questions 1 and 2 here on the activity sheet.

Q1. Record the balanced equation and draw the molecular representations of the reaction. Explain how this representation was derived.

$$\_\_C + \_\_ S \rightarrow \_\_ CS_2$$

Q2. What is the relationship between the "reactants" and "products" atoms? Show work that supports your answer.

3. Balance the remaining equations in the tables for all three levels. Adjust the coefficients that appear in front of each reactant until products are formed without any excess. Once you have balanced the equation, record the coefficients, draw a molecular representation, and record the number of atoms for each element in reactants and products.

Level 1 – Combination Equation and Molecular Representation	# of atoms for each element	
	Reactants	Products
__C + __O_2 → __CO_2		
__K + __Cl_2 → __KCl		
__S + __F_2 → __SF_2		
__Na + __F_2 → __NaF		

Level 2 – Single Replacement Equation and Molecular Representation	# of atoms for each element	
	Reactants	Products
__Na + __H_2O → __H_2 + __NaOH		
__$FeCl_2$ +__ K → __Fe + __KCl		
__NaBr + __F_2 → __NaF + __Br_2		
__AgCl + __Cu → __Ag + __$CuCl_2$		
__HCl + __Zn → __H_2 + __$ZnCl_2$		

Level 3 – Double Replacement Equation and Molecular Representation	# of atoms for each element	
	Reactants	Products
__Na_2S + __PbF_2 → __PbS + __NaF		
__NaOH + __HCl → __H_2O + __NaCl		
__PbF_2 + __Na_2S → __PbS + __NaF		
__LiCl + __H_2S → __Li_2S + __HCl		
__$CaBr_2$ + __K_2S → __KBr + __CaS		

Answer questions 3–6 here on the activity sheet.

Q3. What is the difference between the coefficients and subscripts in a chemical equation?

Q4. Explain how you found the number of atoms for each reactant and product.

Q5. Can you use fractions as coefficients in the chemical equations?

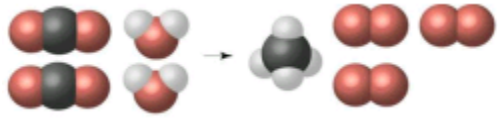
Q6. What are you not able to do when balancing chemical equations? Why?

Move to pages 2.1 – 2.5.

4. Apply what you've learned to answer the questions.

Answer questions 7–11 here on the activity sheet or in the .tns file.

Q7. Is this reaction balanced?



A. Yes, all of the atoms are balanced
B. No, the red atoms are not balanced
C. No, the black atoms are not balanced
D. No, the white atoms are not balanced

Q8. What do you need to do to balance the equation $N_2 + H_2 \rightarrow NH_3$? (Select all that apply.)

A. Double the coefficient of N_2($2N_2$)
B. Multiply coefficient of $H_2$by 3 ($3H_2$)
C. Multiply subscripts of $H_2$by 3 (H_6)
D. Double the subscripts for NH_3(N_2H_6)
E. Double the coefficient of NH_3($2NH_3$)

Q9. Balance the equation given below.

$Au_2S_3 + H_2 \rightarrow Au + H_2S$

Q10. Select all equations that are NOT balanced.

A. $Ag + O_2 \rightarrow AgO$
B. $Sr + H_2SO_4 \rightarrow SrSO_4 + H_2$
C. $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$
D. $KI + Pb(NO_3)_2 \rightarrow PBI_2 + KNO_3$

Q11. For the equation $Fe + H_2SO_4 \rightarrow Fe_2(SO_4)_3 + H_2$ how many atoms of each element are on each side of the equation when it is balanced?

A. 2Fe, 2H, 1S, 4O
B. 2Fe,4H, 2S, 8O
C. 2Fe, 6H, 3S, 12O
D. 2Fe, 8H, 4S, 16O