UNIT 3: ATOMS, ELEMENTS, MOLECULES

Lesson 19: Run the Race!

GUIDING QUESTION: HOW CAN WE COMBINE GRAMS→MOLES CONVERSIONS WITH MOLES→MOLES CONVERSIONS?

**Do Now:** How many moles of Cl are in 13.7 moles of $CaCl_2$?

That's chlorine! Not carbon and iodine!

Step 1) Set up roadmap

Step 2) Determine ratio

Step 3) Set up and solve train track (t-chart)

PRACTICE: IN A 25G SAMPLE OF SODIUM SULFIDE (NA_2S), DETERMINE HOW MANY GRAMS OF SULFUR ARE IN THE SAMPLE.

Step 1: Road Map

| |
|---|
| 25 g Na_2S |

?

g S
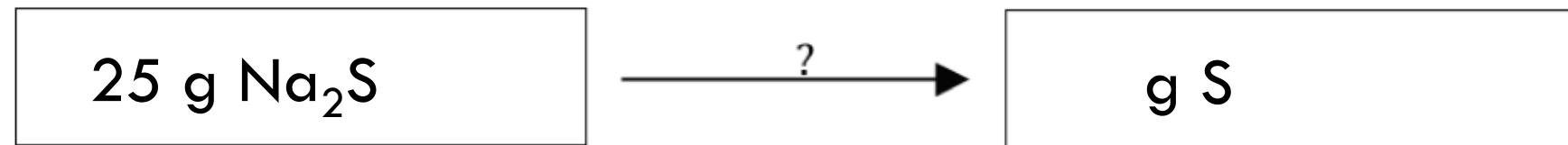
Step 2: Determine ratio

1 Na_2S: 2Na: 1S

Step 3: Determine molar masses

(2 x Na) + (1 x S) = (2 x 22.99g) + (1 x 32.06g)= 78.04 g/mol

STEP 4: SET-UP TRAIN TRACKS

$$\frac{25 \text{ g Na}_2\text{S}}{} \quad \frac{1 \text{ mol Na}_2\text{S}}{78.05 \text{ g Na}_2\text{S}} = 0.32 \text{ mol Na}_2\text{S}$$

MOLAR MASS

STEP 4: SET-UP TRAIN TRACKS

$$\frac{25 \text{ g Na}_2\text{S}}{} \cdot \frac{1 \text{ mol Na}_2\text{S}}{78.05 \text{ g Na}_2\text{S}} = 0.32 \text{ mol Na}_2\text{S}$$

$$\frac{0.32 \text{ mol Na}_2\text{S}}{} \cdot \frac{1 \text{ mol S}}{1 \text{ mol Na}_2\text{S}} = 0.32 \text{ mol S}$$

MOLE RATIO

STEP 4: SET-UP TRAIN TRACKS

$$\frac{25 \text{ g Na}_2\text{S}}{} \cdot \frac{1 \text{ mol Na}_2\text{S}}{78.05 \text{ g Na}_2\text{S}} = 0.32 \text{ mol Na}_2\text{S}$$

$$\frac{0.32 \text{ mol Na}_2\text{S}}{} \cdot \frac{1 \text{ mol S}}{1 \text{ mol Na}_2\text{S}} = 0.32 \text{ mol S}$$

$$\frac{0.32 \text{ mol S}}{} \cdot \frac{32.07 \text{ g S}}{1 \text{ mol S}} = \boxed{\textbf{10.27 g S}}$$
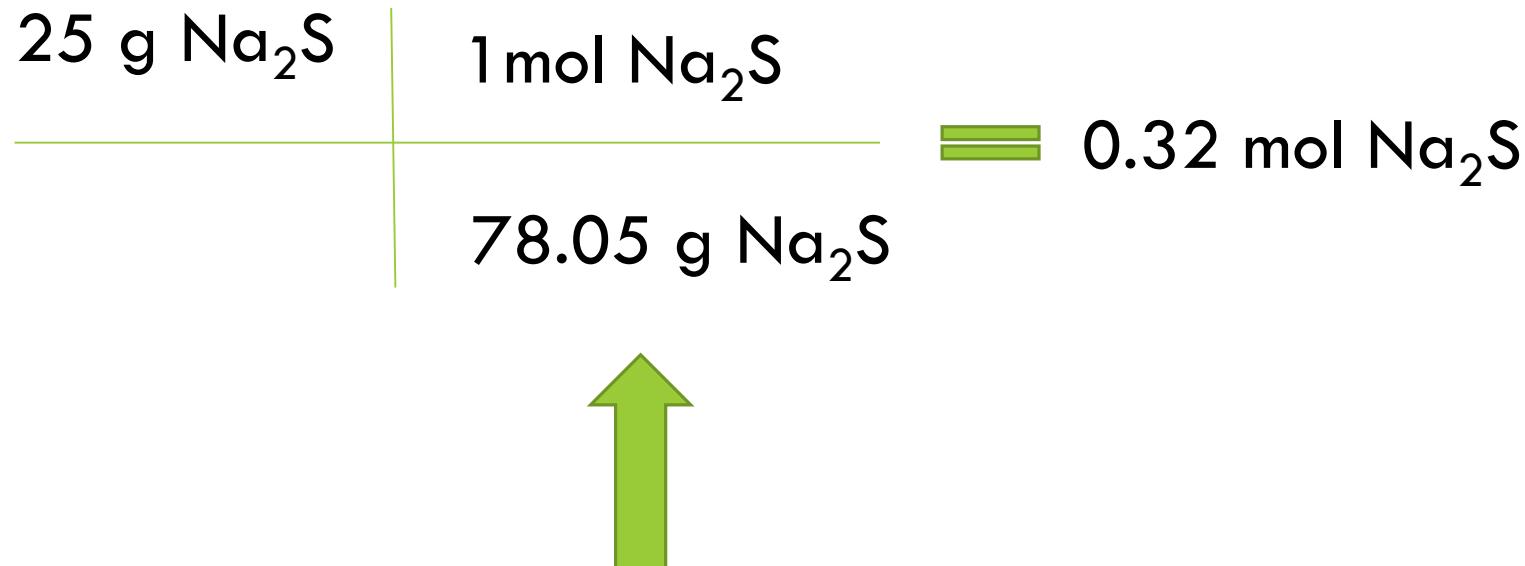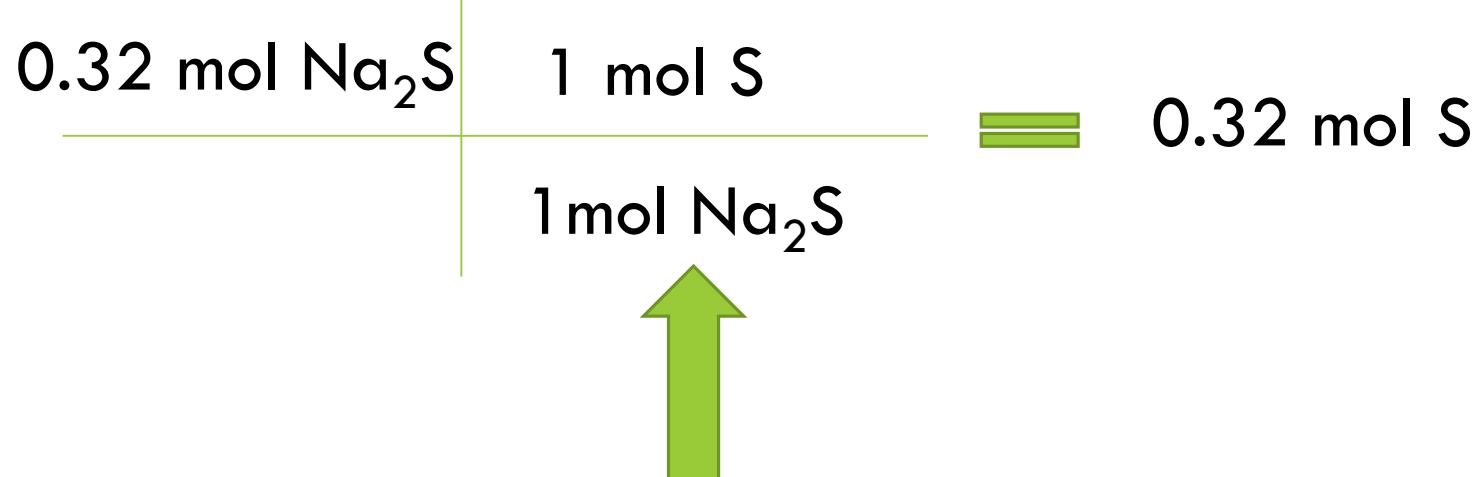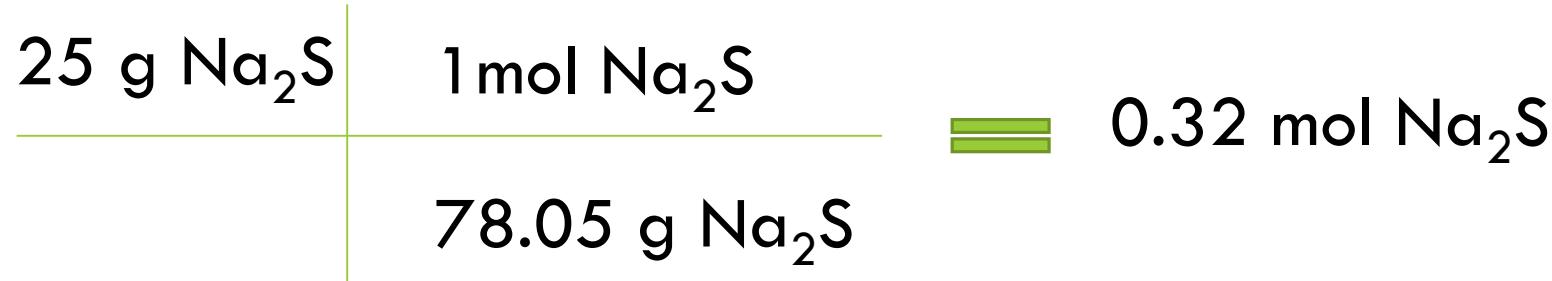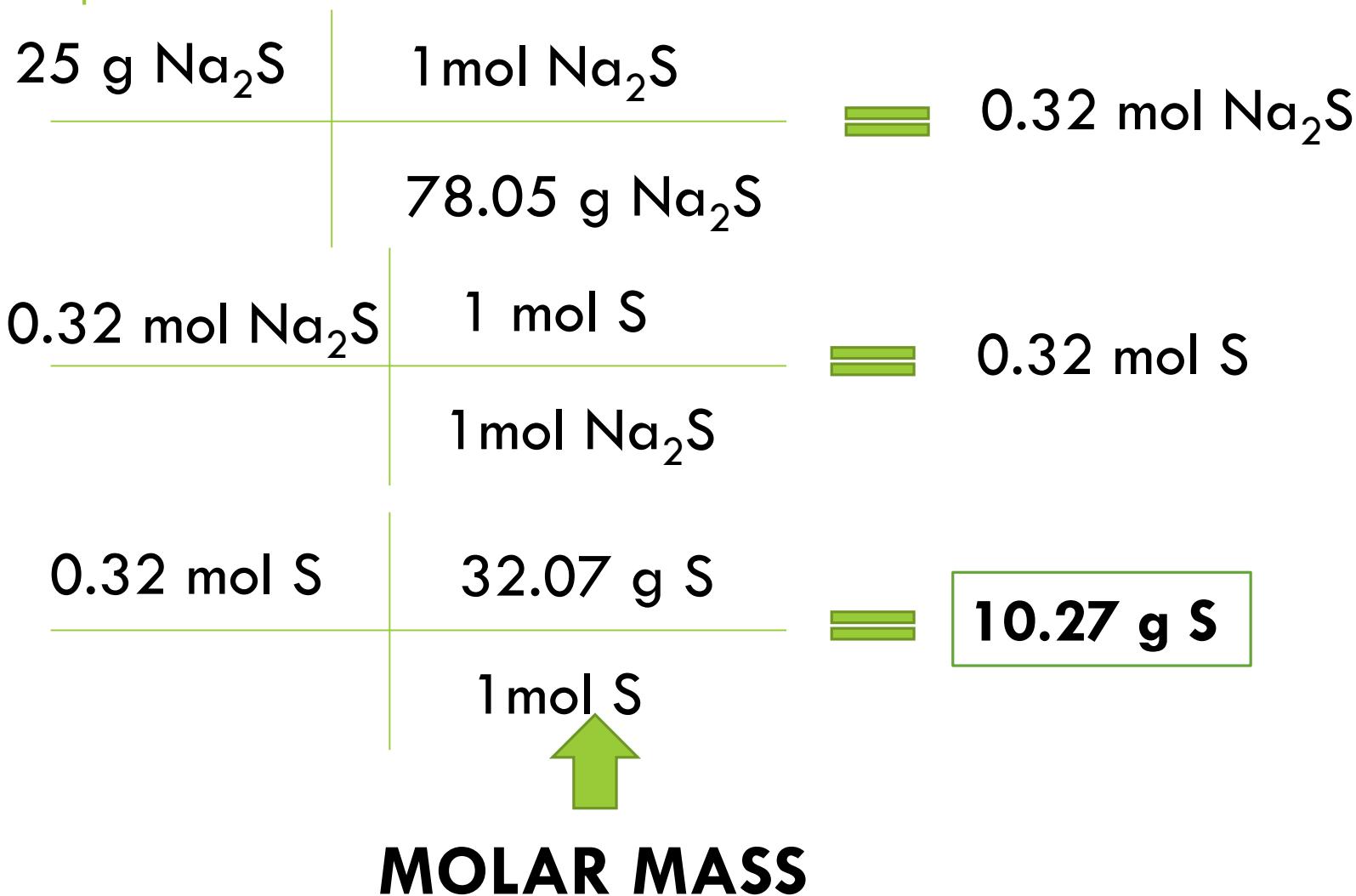
MOLAR MASS

PRACTICE: HOW MUCH SILICON DICHLORIDE, $SICL_2$, IS NEEDED (IN GRAMS) TO HAVE 64G SILICON IN THE SAMPLE?

Step 1: Road Map

64 g Si

?→
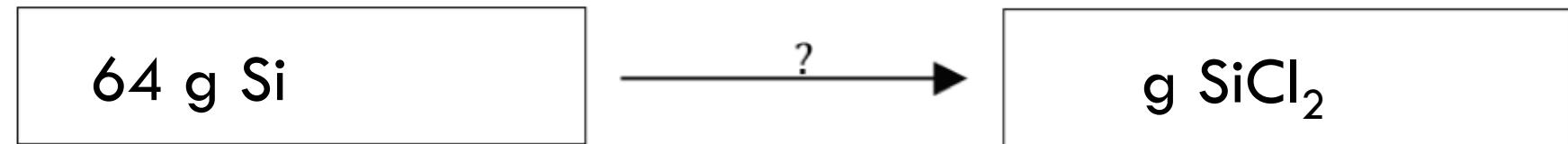
g $SiCl_2$

Step 2: Determine ratio

1 $SiCl_2$: 1Si: 2Cl

Step 3: Determine molar masses

(1 x Si) + (2 x Cl) = (1 x 28.09g) + (2 x 35.45g)= 98.99 g/mol

STEP 4: SET-UP TRAIN TRACKS

64 g Si | 1mol Si

28.09 g Si   = 2.28 mol Si

MOLAR MASS

STEP 4: SET-UP TRAIN TRACKS

64 g Si	1mol Si			=	2.28 mol Si
	28.09 g Si				

2.28 mol Si	1 mol $SiCl_2$	=	2.28 mol $SiCl_2$
	1mol Si		

MOLE RATIO

STEP 4: SET-UP TRAIN TRACKS

64 g Si	1 mol Si		
	28.09 g Si	$=$	2.28 mol Si

2.28 mol Si	1 mol $SiCl_2$		
	1 mol Si	$=$	2.28 mol $SiCl_2$

2.28 mol $SiCl_2$	98.99 g $SiCl_2$		
	1 mol $SiCl_2$	$=$	**225.54 mol $SiCl_2$**

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MOLAR MASS