

Conversion! The Chemistry Board Game Stoichiometry Edition

Note Regarding the following KEYS for the game cards:

Following are two keys. The first key is for a quick answer guide. I like to have a few of them sitting around the room for the students to check if they should have a disagreement on an answer. I do not give each group the key. Or you could just have one copy with you as you monitor the class for reference. I put the quick answer sheet in sheet protectors, and when a group has finished their game, they can check their answers.

Be sure to have students label each problem on their answer sheet either "C" for conversion or "M" for mole and then the card number. For example: in the box at the top left corner of each answer sheet box, students may write C-14 for conversion card #14.

Following the quick answer guide, you will find five pages of complete keys with all problems completely worked out.

A note here: I have my students use molar mass to the hundredths place. So, copper, for example, will be 63.55 g/mol. Or, NaCl will be 58.44 g/mol. This will make a difference in answers if you have your students round to the nearest ones place.

Also, all answers are in correct sig figs. So unless you also require your students to record answers in correct sig figs, this will also make a difference in the answers.



Conversion Key (cards 1-14) Kev CaO + H2O -> Ca(OH)2 Zn + 2HCI -> ZnCl2 + H2 2 29.559 (alt) z / maladt) z / moleadt) z / moleadt) z / moleadt) z 25,49ZnCl2× 1 motencle× 1 motence 65,39 1 2n = 12,2gzn 56.083 (a) = (22.36gal Zn +2HBr > ZnBr2 + H2 CaC2 + HO > C2H2 + CaO 3 5482 Gtz I moleste I moleate 9.7ml ZnBrz × Inol Zn = 9.7mol 22.4 LCzHz / prototo x64,103 cal2 = (1570g Cal2 C5H12+802->5C02+6H50 5 2H/F + CaGH2 > CaF2+ 6 350.gHF × 1 mol HF / mol Call)2 × 79.00 aHF × 1 mol Call)2 × 74.10 g Call +2 = 6489 1 mol Call +2 = 6489 D. 75 molls HIZ & Mol DZ X 22.4 L DZ (=130L02@STP) 8 24/202 -> 21/20 + 02 (r203+3H2 -2Cr +3H30 76,5 gCr2B3 × 1 mol Cr2B3 × 3 mol Hz = (1,51 mol) 7.45g Oz × 1 mol Oz × 2 mol Hzo 18,23 H2O 15209 Cr2B3 × 1 mol Cr2B3 (Hz) 7.45g Oz × 1 mol Oz × 1 mol HzO (= 8.40g HzD 10 HFe +302 -> 2Fe203 4NH3+503-6H20+4NO 924gNHz I motor Hz 4 mol NO (54,2 17.04gNHz 4 mol NHz mol NO 4. 2molfe 2 molfesos, 159.70g Fesus 4 molfe 1 molfesos = 340 gFe203 11 2L:0H + CO2 > Li2003+ HDO 12 2Mg + 03 -> 2Mg0 20.0 molLisCuz 2 molLiOH = (40.0 mol 1 molLisCuz = (40.0 mol 3.75 mol Mg × 2 mol Mg 0 403/g/mg 0 2 mol Mg × 1 mol Mg (= 151g MgD) 13 2Nac1 + H5504 -> Na 504+ 2HCI 14 2Hg0 -> 2Hg + 02 430 Naci Instract 2 moltal 22.4 Likel 1 58.449 Abal & Zmoltal I moltal 1629 02 × 1 Mul Dz × 2 mol H30 32,00902 × 1 mol Dz (10.1 mol Had =16LHCIESTP

Conversion Key (cards 15-30) Kev NH4N03 > N20+2420 mg +2/4C1 > mgc12+ H2 15 16 53,09160, 1 mollbo 1 mol NH/MB x 44,029150× 1 mol NGO 4, TmolMg × 2 molHc/ × 36.462,Hcl = 06 aNHUNUS = (96, 4g NHUNO3 1 mol NHUNOS = (96, 4g NHUNO3 80,06 340g HCI 2KI + PL(NO3)2 > PLI2+ 18 2KC/02->2KC1 +302 2KN03 23, 4mol KC/03, 3 mol 00 × 22.42.02 4.5 mol KI _ mol PBI2 2.3 mol 2 mol KI = 2.3 mol PDI2 = 786L 02@STP AqNB+ Nacl = Agcl + Zn + CuSO4 > ZnSO4+ Cu 20 NaNO3 48.4 gCuSOy 1 molCuSay 1 molCu 3550Ch 159.620 CuSoy X 1 molCuSoy 1 mol Agel × H3.32g 12 mol Ag NU3 63,55gCy1 mollu = 19.3g Cu (= 1700 g Age BCaCO3+2H3PO4 → Ca3PO4)2 22 21 LIZN+3HO - NHS+3LIOH +3C03+3HD 57.8 gLizN I mollizN I mof NH3 × 34,83 gLizN × I mollizN × 6.022 x 10²³ molecules NH3 (9.99 × 10²³) Mol NH3 (molecules NH3) Molcon X 3 Mol Calls X 6.022 × 102 mole cules NH3 / mol NH3 ales = (3.4g Calos $242C_{2}H_{2}+50_{2} + 4C_{2}+2H_{0}$ CO+242→ CH30H 23 24,74 C3HZ × 1 molC2Hz, 5 molO2 × 22.4 LOZ 1 22.4 LC2Hz 2 molC2Hz 1 molO2 375g CHOH / molchoH × 1 molco x32,05 g CHOH × 1 molchot x6.022 x 10 moleculus CO = 7.05 × 10 x 1 mol CO (membroc =61,8202@STP ZNAN3 > ZNA+3N2 26 Fez 03 +300 +2Fe +3005 25 125gNarts / molNorts, 3 molN2 65.02gNarts 2 molNarts 45,32 CO2 × 1 moleon × 1 mol Fords B.42 CO2 × 3 moleon D. 4LNS - 64.6LNS @STI 59,700 Fe-03 + 1089 Fe-03 J/ + Brz -> ZLiBr C12 H22011 +BO2 -11H20+BCO2 28 27 72.5gLiBr / mseliBr x 2 moll 4,09×102 molecules Cor 1 mol (2, 1 mol gates " (= 0.835 molli 1 342.34 g CizHzzDil = 19.4 g CizHzz 30 Zn 2 As, + 6HCI - 2 AsH3 + 29 5 F2 +2N H3 > NSF4 + 6 HF 96.2 NH3 × 1 MORNH3 × 6 Mol HF 6.02 market F 1. 02 × 1025 17.04 gNH3 × 2 MORNH3 × 1 Mol HF molecules HF 26.4LASH3 I MORAH3 32nCl2 1.02 × 1025 NO ASA3 X 36

Kev Mole Key (cards 1-12) HF = limiting reagen Caloz= limiting reagent. 2 R.5g Ca CO3) Instacts x 2 mol H3Par X 100,99 Ca CO3 X 3 mol Ca CB X 100,99 Ca CO3 X 3 mol Ca CB 10,5 molth 1 mol 502 = 2.6 3 mol 5,02 1/mitring 4 molth = 2.6 3 mol 5,02 X 98.000 H3PDy = 5,5g H3PDy 1 Mol H3PDy = 5,5g H3PDy ZnS - limiting-well be used up completely. 4 H= limiting reagent Lave need HAVE 2,5 mol Zn 5, 3 mol O2 NEED a mol Zn 5 3,75 mol 6,8 molN2 3 nol 1/2 20, mot Excess 1 Hz limiting DZ Fyces HAVEIN, The Ind Agilles x / mol N; HSO g Ag NO3 I MOLAGINES x / mol N; X 169.880 Agilles x 2 mol Agilles HAVE Limiting Imollus 3 mol Or 5.62 Sus 2 mollus 6 7. Sques = NEED × 58,69g N, 1 1 Moeni 8.78902 789Ni Excess Excess 325gN; - 78gN; = 247gN; 59 Cus, Inolais 2 molau 79.55 Cul leftore 0.15 nol Fe 3 moleusoy -0.23 37, 09 Nasses 1 Mol Nossos × 2 Hol HCI 1260501 Nassos × 1 mol Nossos 126,0501 Abysol3 36.46 g Hel = ZI. 4 g He I NOPHEL = NEED 37.0g Na 203, /mol Na 203 × 1 mol 502 /4.070 502 - 17 00 Na 203 0.15 molte × 3 molcu \$355 gCu = Halu 20 yield= actual yield x100 10 24100 = 115g × 100 2 yield = 52.73 x 100 2 yield = 87.82 20 yield = 8825 1/ 63.59 GHz [mol(2Hz 1 mol) CHBr2 X345.849 CHBr2 CHBr2 1 mol CHBr2 CHBr2 1 mol CHBr2 CHBr2 1 mol CHBr 12 73.4gCx 1 mdCx 4 molths 74.92 gAs = Rolge X 3 mole x 1 molths 11 611 gAs Herriti Do yield = 4979 = 81.395 Byield = 6859 Dyield = 81.4 %

Mole Key (cards 13-24) HAVE reactent NH3= limiting 1.55 gills I mollub I mol 03 13 HAVE I MITIS I MOR NH3 x 5 MOROZ 5. 10 x 104 Mits I Mor NH3 x 5 Mor OZ X 1704 9 NH3 4 MORNHS X HODI & NO 2 MORND × 48,000 03 0,809903 1 moloz 1.559 NO2 × 1000 1 100 1005 1089 32,000 02 = 1,20 × 105 02 1 mil 02 = EXCESS NEED Impl 1.820 N205 9. 459 CT I mol Cu x 4 mol Hnbs 3.68 map NH3 NEE 63.55 gCu 5 mol 02 = 4,60 16 15 1 mollie ×63.02 g1+NU3 = 37.5 g HANDS 4 mul NH3 molls limiting Excess 4 molNo = 3.40 molNo 44.5gHNB - 37.5g= (7.0gHNB 5 moloz eft over 24.89 m 1 I molan 2 mol Agues 18 3.5Jacu 1 mollin 169.88 Agrilles NEED 20 yield= 21.359 × 100 24.59 133g AgNO3 Biting 1 moltanoz × 1 mol (1, (13)2 2 mol Agnis moldente 1159 AgNOS = 87.1840ld 57 culus \$ AgNUz = 63.5g Culoz) 650g mgt = 1 mol Mats 1 mol Bra 278.119 Matz × 1 mol Matz HAUR HAVE 525g Mgtz 19 protingla MOLBERZ TR.119MgI2 1 mol mata 1 Molles = 370gBrz Excess 3.50 Brz need = 302 gBrz Excess 1 molBrz 650g MgID × 1 motinged × 1 motingta 82gBrz in 384gBr2 - 302g excess =5 ave limiting 3 mol Co 2. 5kg Fezos, 1000g Fezos, 1 Moltrad × 100.09 glacoz × 1 mol cao 1 moltes 22 4g Callo 21 22 159,709 Fesus Eg need x56.080 CaD 28,01 2 C.b. X = 1. 3kgCC 1 millox excess = 12,6gCaO 10000 1 molCaD 3 molas 1 milFesos 1000 g Fest 7. SkaFerls 2 yild = 12.83 1 moltais 59,709 Feb03 Eg 4LCI molas yield=102% (1100200 20 yield= Imolsion X 3 mol C 945L x100 60.09 95,02 1 molsion 24 スス 1100L = 862 x 12.010 35.09 Cu x 63.55 g Cu = 6,84gC Need Excess I mollin , a mol Hzo, 1 mal 1 mollie 1.495:02 × 1 molsioz × 2 mol CO × 22.4 CO molecules 120 6.63× 1023 ,022×10 8.3L = 8,50LCO Byield == 1 molto ×100 molecules Ho 8.50L 98% yeld

Mole Key (cards 25-3	0)		Kev
25 300 25:02 × 1 molsida × 1 molsida 60,095:02 × 1 molsida	26	18.49 No X TRODAND X	3 molto 1 molto2
x 40,1095:C = 33,495:C	X2 18.40	N2 1 mol No 2 mol NH3	(cess , 10/2/143 = 22.49
2442d= 24,49 × 100 24 88.03	2044	1d = 12.09 × 100 2 yes	1 Mol NHB NH3 11 = 53,62
27 2.44 gA1 1 molA1 3molCu 26.98 gA1 2 molA1	28		
x6353 00 = 8.62gCu 1 Mollu = 8.62gCu	0.0	22442503 1 motosx	2 molsoz
Byeld 8,623 Byeld=60.92	Xª	1 moloz × 1000mL02 +	12.2mL02
29 3.4 mol ROIT I mol H& POY = 1/mol H POY need	30	<u>34.6 gAl</u> x Imol Al x 133.33 gAlcis = 17	2 mol AI 2 mol AI 9 AICI3
5. 8 moltspay - 1.1 moltspay =	By	ield = 130.7 gx 100	
(4.7 mol H3toy Tettover)		Doyiel	1 = 76,42
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