Cheatography

SAT Chemistry Cheat Sheet

by Jianmin Feng (taotao) via cheatography.com/79308/cs/19713/

Basic stuff

Mass	amount of matter (g,kg,ml)
matter	anything occupies space & has mass
Volume	room space, l, ml, gas, solid, liquid
Density	mass/volume=kg/m^3
pressure	barometer, manometer
	760torr=760mmHg=1atm
energy	to work, transfer heat, cal, j,kj, calorimeter
	heat, light,kinetic, bond
temperature	average kinetic energy of molecule,273k=0^oC,373k=100^oC
heat	flow of kinetic energy from body of high temp to low temp
heat capacity	amount of heat abosorbed with 1^oC increase
specific heat	heat capacity of 1 gram of substance
q=mc*deltaT	heat=mass *specific heat* delta Temp

Atom: building blocks of matter

element	substance can't be broken down into a simpler substance by chemical reaction;most fundermental union of matter, can't broken down w/o losing their identity
atom	smallest particle of an element that still retains the chem properties of the element
	neucleon(proton+neutron)+electron

Atom: building blocks of matter (cont)

ion	atom lose/gain electrons: cation(+) anion(-)
proton	+1,1amu
neuton	0,1amu
eletron	-1,0amu
perodic table	group=column, row=period
atomic number =proton#, identity	
atomic mass=proton mass + neutron mass	
isotype	same proton#,different neutron
atomic weight = average mass of isotypes occurred on earth	

Solution

Measures	Molarity, molality, percent of mass
solubility	solid, gas, solvent, solute, like solve like, pressure, temperature
saturation	
electrolytes	ionic substance, break of ionic bond, neutral overall,conduct electricity
boiling & freezing point	delta T = kmi; k constant of solvent; m molality; i particles solved into; CaCl2 in snow day
precipitation	ionic solution,double replacement reaction
solubility rules	soluble:NO3-,ClO4-,Alkali metal,aNH4+
	insoluble:silver,lead,mercury,OH-

Kinetics and equlibrium

Kinetics	reaction rate: collision/re-orientation, bond break/making,activated complex
kinetic factors	concentration(g,l), pressure(g), surface area(s,l),temperature-(10c=double), nature of reactants(bond strenght),catalyst,
catalyst	not consume, lower Ea activation energy,not change equlibrium
collision freq	concentration, surface area, temp
collision energy	temp, nature of reactant,catalyst
chemical equilibrim	dynamic chemical equilibrim, both direction in the same speed, reactant concentration not changed anymore
Keq	>1 favor forward reaction, <1 favor reverse reaction
phase change equlibrim	
Le Chaetlier's principle	
Keq never changes with reacted concentration; Keq change with heat stress;reaction shift to relieve the stress	
pressure change the equlibrium on gas reactant	
catalyst won't change equlibrium	
Ksp	solubility product constant for precipitation reaction equlibrium

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acid and base

autoionoz-ation	H+ + OH- <=> H2O
Kw	$[H+][OH-]=10^{-14}M^2$ at 25°C
pH=7	$-\log([H+])=-\log(10^{-7})$ at 25°C
acid	proton/H+ donor; electron pair acceptor
base	proton(OH-) acceptor; electron pair donor
amphoteric ion	HCO3-(aq)
strong acid/base	complete disassociating and not reversable
Strong acid:0	HCl,HBr,BI,HNO3,H2-SO4,HCLO4
Strong base:14	LiOH,NaOH,KOH... Sr(OH)-2,Ba(OH)2
calc pH	pH=-log([H+]) = 14-(-log[-OH-])=14-pOH
weak base acid	partial /reversible dissociation, <10%
calc pH	using ka or Kb to get concen-tration of H+ and OH-
polyprotic acid	monoprotic acid
conjugate acid/base pair	mol formula same, except ONLY 1 H+
	HCl-Cl, H2O-OH-, H2SO4--HSO4,Na+-NaOH
Buffer	minimize pH change with a conjugated pair of weak acid and based,

acid and base (cont)

titration	concentration of unknown; weak or strong acid/base of unknow-n;pKa pKb of unknown
equiva-lence point	titration curve, reflection/end point; M1V1=M2V2f
red-blue indicator	H-Indicator<=>H+(aq) + indica-tor(aq); color change at 7, buret

oxidation and reduction

LEO	lose electron=oxidation
GER	Gain electron=reduction
oxidation state	adds up to 0; assign oxidatation number based on electronegat-ivity
oxidation number	total=0;oxigen(-2),alkali(+1),-alkali earth(+2),halogens (-1),OH(+-1)
balance redox reaction: total eletron balance	
oxidant=oxidant agent, reducing agent	
activity series	
Rustin-g(O2)	2Fe(s) +3O2 ->Fe2O3(s)
dissolvin-g(H-+,H2O)	Pb(s)+2H+ ->H2(g) +Pb2+
Nitric acid disolution	NO2 is browish yellow toxic gas produced

Organic chem and environmental chemistry

Organic chemistry

Carbon, no polar covalent bond

soluble in non polar solution, not in water

no dissociate in solution, no ion in solution, not conductor, not electrolyte

Organic chem and environmental chemistry (cont)

isomer: same composite different geometry and chemical property, ethanol vs dimethyl

Hydrocarbon

alkanes	CnH2n+2, single bonds

Meth- eth- prop-but-pent-hex-

alkenes	CnH2n, >=1 double bond

-ane(all single bonds), -ene(>=1 doube), -yne (>=1 trible)

alkynes	CnH2n-2, >=1 trible bond
Hydrocarbon rings	aromatic hydrocarbons

functional groups

-OH, -Cl, -COOH, -NH2, -COH aldehydes ,ketone -C=O , ether -COC-, ester COOC

Organic reactions

Addition: C=C --> C-C

substitution

polymerization: monomer ->

creaking

combustion: hydrocarbon -> CO2+H2O, CO2:44, H2O:18

esterification: COOH + OH -> COOC + H2o

Biomolecular

LIpids; carbonhydrate, nucleic acid, protein

Environmental chemistry

atmosphere:N2 78%,O2 20%,Ar <1%,H2O, othe <1%; Troposphere,str-ato,meso, thermo

Ozone, O3: O2+gamma-> 2O(photodissoci-ation), O+O2->O3(absorb solar radiation), CFCs consume O3 (CFCS +light->free Cl, then consume O3 to form ClO)

GreenHouse effect

Acid Rain: SO2 -->SO3 +H2O->H2SO4(aq)

Carbon monoxide

Lab
Safety
accuracyH how correct a measure is; precision is how exact a measure is, compared to real measurement
Buret washing; hot object weigt;
significant figures: least sighnicant after operation, 2500 has 2 significant figure, 2500. has 4, 3 mole = 3.000000moles
Procedures
filtration - >distillation ->chromatography
titration: Ma*Vz* = *Mb* Vb, litmus: pink->blue, phenolphthanlein : clear->pink
Identifying chemicals
precipitation: AgCl
Conduction: Ion condictivity
Flame test:alkali (earth metal) Li/Sr Red, Ca:orange, Na: yellow, Ba: green, K: Violet
colored solution: CU2+ blue, Ni2+ green, Co2+ pink, Fe3+ yellow, CrO4- Yellow, CrO72 Orange, MnO4- deep purple
gas evolution:mannometer Erlenmmyer tube, splint test
calorimetery: Q=mc DeltaT
Equipment
Beaker, buret, burner, crucible tongs, dopper pipette,Erlenmeyer flask,evaporating dish,florence flask, forcepts,funnel,graduated cylinder,volumetric flask, metal spatula,mortar amd pestle,pipetter bulb, platform balance, ring clamp,