**Formulas for the MCAT**

Note: The AAMC does not indicate which formulas should be memorized. This is a list of most of the formulas needed for the MCAT; however, it may not be exhaustive. Examinees should understand these formulas, but not all of them need to be memorized. Judgement should be used in

deciding which to memorize. The ones that certainly should be memorized are in bold face.

**General Chemistry**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of moles = mass in grams / molecular weight** | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |  |  |  |  |  |  |  |  |  |  |
| **PV = nRT** | | | | | | | |  |  |  |  | **KE  T** | | |  |  |  |  |  |  |  |  | v (T/mw) | | | | | | |  |  | **PT = P1 + P2 + P3 + ...** | | | | | |  |
| P = mole fraction of solvent x Po | | | | | | | | | | | | | | | | | |  |  |  |  |  | P = mole fraction of solute x Po | | | | | | | | | |  |  |  |  |  |  |
| TBP = kb (molality of solute particles) | | | | | | | | | | | | | | | | | | | |  |  |  | TFP = -kf (molality of solute particles) | | | | | | | | | |  |  |  |  |  |  |
| Osmotic Pressure = RT [molarity of solute particles] | | | | | | | | | | | | | | | | | | | | | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **pH = -log** | | | | | | | **10** | | | **[H+]** | | pOH = -log | | | | | | 10 | [OH-] |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| K = [H+] [OH-] = 10-14 (at 25oC) | | | | | | | | | | | | | | | | | |  |  |  |  |  | pK | | w | | = 14 |  |  |  |  |  |  |  |  |  |  |  |
| w | | **= [H+] [A-] / [HA]** | | | | | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | K K = K | | | |  | = 10-14 |  |
| **K** | **a** |  |  |  |  |  |  |  |  |  |  |  | K = [HA] [OH-] / [A-] | | | | | | | | | w |  |
|  |  |  | **= -log** | | | |  |  | **K** |  | pK |  | = -log K | | | | | |  |  |  | b |  |  |  | + pK |  | = pK |  | = 14 | ab | | |  |  |  |
| **pK** | | | **a** |  |  |  | b |  |  |  | pK | | a |  | b | w | **pH = pK** | | | **a** | **+ log [A-]/[HA]** | |  |
|  |  |  |  |  |  |  | **10 a** | | |  |  |  |  |  | 10 b | | |  |  |  |  |  |  |  |  |  |  |  |  |  | **10** |  |
| E = q + w | | | | | | | |  |  |  |  | **G = H - TS** | | | | | | | |  |  |  | G = G° + RTlnQ | | | | | | | | | K eq = eG°/-RT | | | | | |  |
| E = E° - (RT/nF)lnQ = E° - (0.026/n)lnQ | | | | | | | | | | | | | | | | | | | |  |  |  | K eq = enFE°/RT | | | | | | |  |  | G° = -nFE° | | | | | |  |
| Moles = It/nF | | | | | | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 0 order reaction: | | | | | | | | | | | |  |  |  |  |  |  |  |  |  |  |  | dA/dt = k | | | | | |  |  |  | At = A0 - kt | | | | |  |  |
| 1st order reaction: | | | | | | | | | | | |  |  |  |  |  |  |  |  |  |  |  | dA/dt = kA | | | | | | |  |  | At = A0e-kt | | | | |  |  |
| 2nd order reaction: | | | | | | | | | | | |  |  |  |  |  |  |  |  |  |  |  | dA/dt = kA2 | | | | | | |  |  | 1/A | t | = (1/A ) + kt | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0 |  |
| **Physics** | | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **v = u + at** | | | | | | | |  |  |  |  | **v² = u² + 2as** | | | | | | | |  |  |  | **s = ut + ½at²** | | | | | | |  |  |  |  |  |  |  |  |  |
| **F = ma** | | | | | | |  |  |  |  |  | **F = Gm** | | |  | **m /r2** | | | |  |  |  | **a = v2/r** | | | | |  |  |  |  |  |  |  |  |  |  |  |
| Static friction = FN S | | | | | | | | | | | |  |  | **1** | |  | **2** | |  |  |  |  | Dynamic friction = FN D | | | | | | | | |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MA = load/effort = number of supporting ropes in a frictionless pulley system | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |  |  |  |  |  |
| VR = distance moved by effort / distance moved by load = number of supporting ropes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |  |  |  |  |  |
| Efficiency = work out / work in | | | | | | | | | | | | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Moment = F x perpendicular distance to pivot point** | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |  |  |  |  |  |  |  |  |  |  |
| **Momentum = mv** | | | | | | | | | | | | **mv before collision = mv after collision** | | | | | | | | | | | | | | | | | | |  | **Impulse = Ft** | |  |  |  |  |  |
| **PE = mgh** | | | | | | | |  |  |  |  |  |  |  |  |  |  | **2** |  |  |  |  | **Work done = Fd** | | | | | | | |  | **Power = Fd/t** | | |  |  |  |  |
|  |  |  |  | **KE = ½mv** | | | | | | |  |  |  |  |  |  |  |  |  |
| **l = kF** | | | | | | |  |  |  |  |  | Y = stress / strain = (F/A) / (l/l) | | | | | | | | | | | | | | | |  |  |  |  |  |  |  |  |  |  |  |
| S = stress / strain = (perpendicular F/A) / (x/l) | | | | | | | | | | | | | | | | | | | | | | |  |  |  |  | B = stress / strain = P / (V/V) | | | | | | | |  |  |  |  |
| f (k/m) | | | | | | | |  |  |  |  | **T = 2(l/g)** | | | | | | |  |  |  |  | ** = m/V** | | | | |  |  |  |  | **Hydrostatic pressure = gh** | | | | | |  |
| **Upward force on a body = weight of fluid displaced by that body** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |
|  | A v | | | | 1 | =  | | | A v | | 2 | P + gh | | | 1 | | + ½v 2 | | | = P | 2 | + gh | | 2 | | + ½v 2 | | | |  |  |  |  |  |  |  |  |  |
| 1 |  |  | 1 |  |  | 2 | |  | 2 | 1 |  |  |  |  | 1 |  |  |  |  |  |  | 2 |  |  | Velocity of sound in a solid = (Y/) | | | | | |  |
| Velocity of sound in a fluid, v = | | | | | | | | | | | | | | | | | (B/) | | |  |  |  | v (T/mw) | | | | | | |  |  |  |
| Velocity of a wave in a taut string = (tension/[mass/length]) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |  | dB = 10log10(I/I0) | | |  |  |  |  |
| **Beat frequency = difference between the two frequencies** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |  | **f’ = f(C±Vd / C±Vs)** | | | | | |  |
| **F = kq1q2/r²** | | | | | | | | | | |  | **E = F/q** | | |  |  |  |  |  |  |  |  | **Between two parallel plates, E = V/d** | | | | | | | | | |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **Concerning a point charge, E = kq/r²** | | | | | | | | | | |  |  |  |  |  |
| V = Fd/q | | | | | | |  |  |  |  |  | **V = IR** | | |  |  |  |  |  |  |  |  | **Resistivity = RA/l** | | | | | | | | |  |  |  |  |  |  |  |
| **For resistors in series, RT = R1 + R2 + R3 + ...** | | | | | | | | | | | | | | | | | | | | | | | **For resistors in parallel, 1/RT = 1/R1 + 1/R2 + 1/R3 + ...** | | | | | | | | | | | | | | |  |
| **C = q/V = permitivity x A/d** | | | | | | | | | | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **For capacitors in series, 1/CT = 1/C1 + 1/C2 + 1/C3 + ... For capacitors in parallel, CT = C1 + C2 + C3 + ...** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |
| **P = IV** | | | | | |  |  |  |  |  |  | **If a.c., P = (Imax/2) (Vmax/2) = Imax Vmax/2** | | | | | | | | | | | | | | | | | | |  |  |  |  |  |  |  |  |
| **n1sin i = n2sin r** | | | | | | | | | | | | **Lens power = 1/f,** where f is the focal length in m. Lens power is measured in diopters. | | | | | | | | | | | | | | | | | | | | | | | | | |  |
| **1/f = 1/u + 1/v** | | | | | | | | | | |  | Two lenses in contact: 1/F = 1/f1 + 1/f2 | | | | | | | | | | | | | | | | | |  |  | E = hf |  |  |  |  |  |  |
| At = Aoe-kt | | | | | | | | |  |  |  | t½ = ln2/k | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Biology** | | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **p2 + 2pq + q2 = 1** | | | | | | | | | | | |  |  |  |  |  |  |  |  |  |  |  | Number of different gamete genotypes = 2n | | | | | | | | | | | |  |  |  |  |

Maximum number of stereoisomers with n stereogenic centers = 2n