EMPIRICAL & MOLECULAR FORMULAE

Question One: A molecule called 2,2-dibromoethane has a mass composition of 12.8% carbon, 2.13% hydrogen and 85.1% bromine and a molar mass of 188 g mol^{-1}
M(C) = 12.0 g mol^{-1}, M(H) = 1.00 g $mol^{-1}$and M(Br) = 79.9 g mol^{-1}
Find the empirical and molecular formula for 2.2-dibromoethane

Question Two: Decanedioic acid has a mass composition of 59.4% carbon, 8.91% hydrogen and 31.7% oxygen and a molar mass of 202 g mol^{-1}
M(C) = 12.0 g mol^{-1}, M(H) = 1.00 g mol^{-1} and M(O) = 16.0 g mol^{-1}
Find the empirical and molecular formula for decanedioic acid

Question Three: Adipic acid has a mass composition of 49.3% carbon, 6.85% hydrogen and 43.8% oxygen and a molar mass of 146 g mol^{-1}
M(C) = 12.0 g mol^{-1}, M(H) = 1.00 g $mol^{-1}$and M(O) = 16.0 g mol^{-1}
Find the empirical and molecular formula for adipic acid

Question Four: Pimelic acid has a mass composition of 52.5% carbon, 7.5% hydrogen and 40.0% oxygen and a molar mass of 160 g mol^{-1}
M(C) = 12.0 g mol^{-1}, M(H) = 1.00 g mol^{-1} and M(O) = 16.0 g mol^{-1}
Find the empirical and molecular formula for pimelic acid

Question Five: Diphenylethylenediamine has a mass composition of 79.2% carbon, 7.55% hydrogen and 13.2% nitrogen and a molar mass of 212 g mol^{-1}
M(C) = 12.0 g mol^{-1}, *M*(H) = 1.00 g mol^{-1} and *M*(N) = 14.0 g mol^{-1}
Find the empirical and molecular formula for dimethylethylenediamine

Question Six: diacetyl has a mass composition of 55.8% carbon, 6.98% hydrogen and 37.2% oxygen and a molar mass of 86.0 g mol^{-1}
M(C) = 12.0 g mol^{-1}, M(H) = 1.00 g mol^{-1} and M(O) = 16.0 g mol^{-1}
Find the empirical and molecular formula for diacetyl

Question Seven: A molecule called 1,4-butandiol has a mass composition of 53.3% carbon, 11.1% hydrogen and 35.6% oxygen and a molar mass of 90.0 g mol^{-1}
M(C) = 12.0 g mol^{-1}, M(H) = 1.00 g mol^{-1} and M(O) = 16.0 g mol^{-1}
Find the empirical and molecular formula for 1.4-butandiol

Question Eight: Butyl butanoate has a mass composition of 66.7% carbon, 11.1% hydrogen and 22.2% oxygen and a molar mass of 144 g mol^{-1}
M(C) = 12.0 g mol^{-1}, M(H) = 1.00 g mol^{-1} and M(O) = 16.0 g mol^{-1}
Find the empirical and molecular formula for butyl butanoate

Question Nine: Propyl hexanoate has a mass composition of 68.4% carbon, 11.4% hydrogen and 20.3% oxygen and a molar mass of 158 g mol^{-1}
M(C) = 12.0 g mol^{-1}, M(H) = 1.00 g mol^{-1} and M(O) = 16.0 g mol^{-1}
Find the empirical and molecular formula for propyl hexanoate

Question Ten: Putrescine has a mass composition of 54.5% carbon, 13.64% hydrogen and 31.8% nitrogen and a molar mass of 88g mol^{-1}
M(C) = 12.0 g mol^{-1}, M(H) = 1.00 g mol^{-1} and M(N) = 14.0 g mol^{-1}
Find the empirical and molecular formula for putrescine.

ANSWERS

Q1	ef	CH_2Br	mf	$C_2H_4Br_2$
Q2	ef	$C_5H_9O_2$	mf	$C_{10}H_{18}O_4$
Q3	ef	$C_3H_5O_2$	mf	$C_6H_{10}O_4$
Q4	ef	$C_7H_{12}O_4$	mf	$C_7H_{12}O_4$
Q5	ef	C_7H_8N	mf	$C_{14}H_{16}N_2$
Q6	ef	C_2H_3O	mf	$C_4H_6O_2$
Q7	ef	C_2H_5O	mf	$C_4H_{10}O_2$
Q8	ef	C_4H_8O	mf	$C_8H_{16}O_2$
Q9	ef	$C_9H_{18}O_2$	mf	$C_9H_{18}O_2$
Q10	ef	C_2H_6N	mf	$C_4H_{12}N_2$