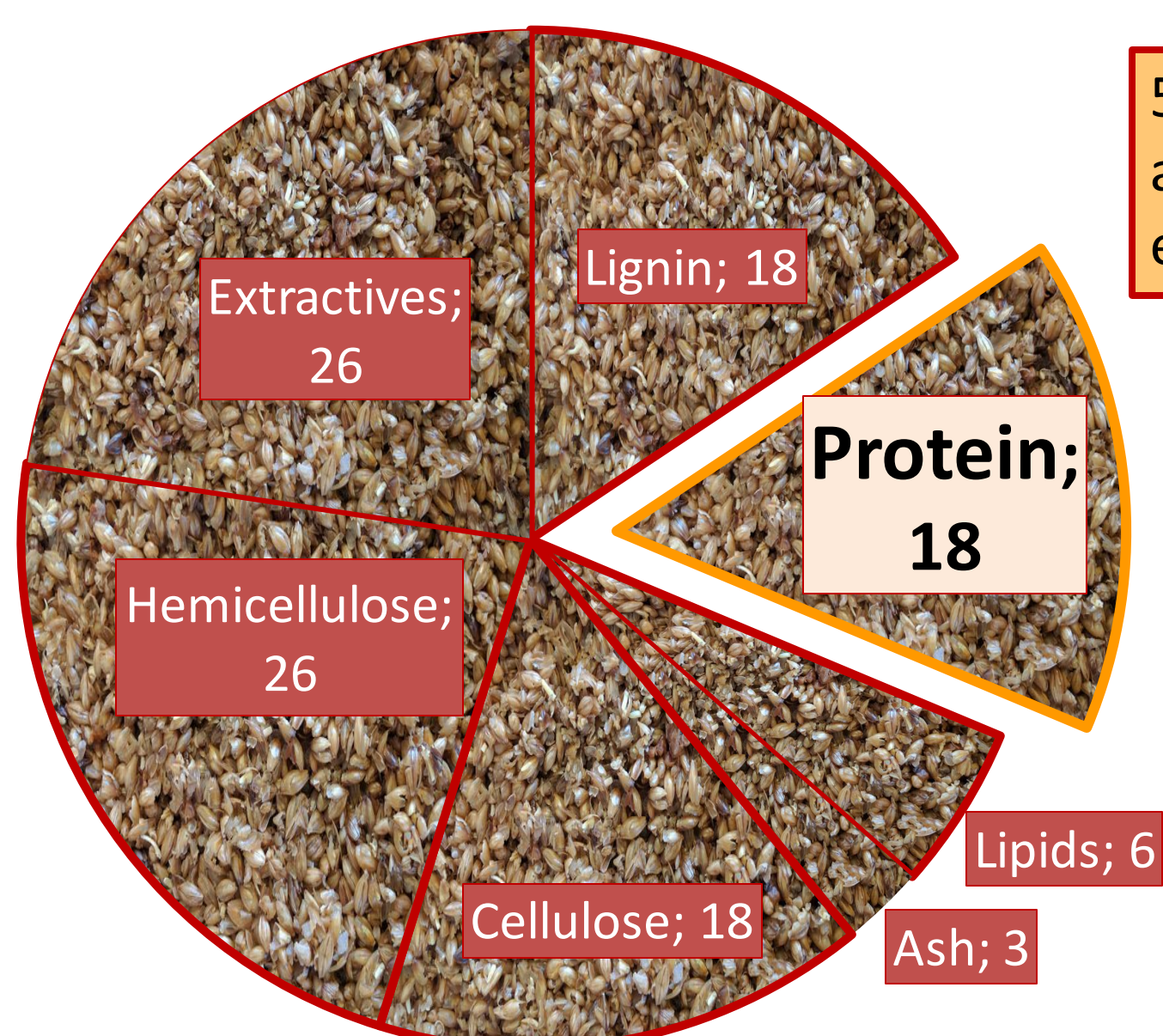




# SUBCRITICAL WATER FRACTIONATION OF PROTEINS AND FREE AMINO ACIDS FROM BREWER'S SPENT GRAIN (BSG)

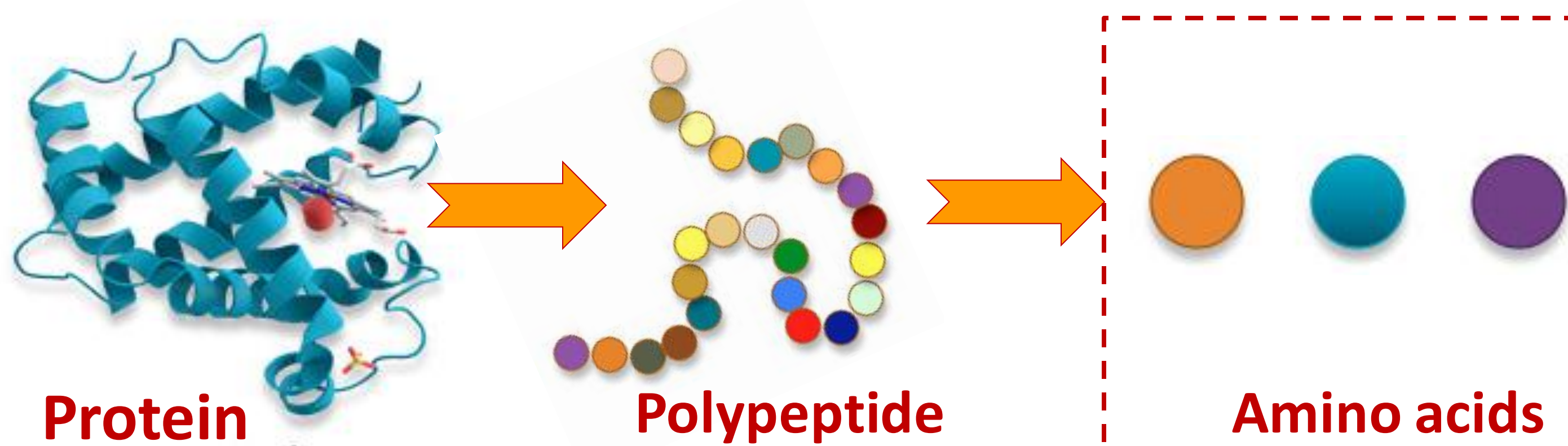
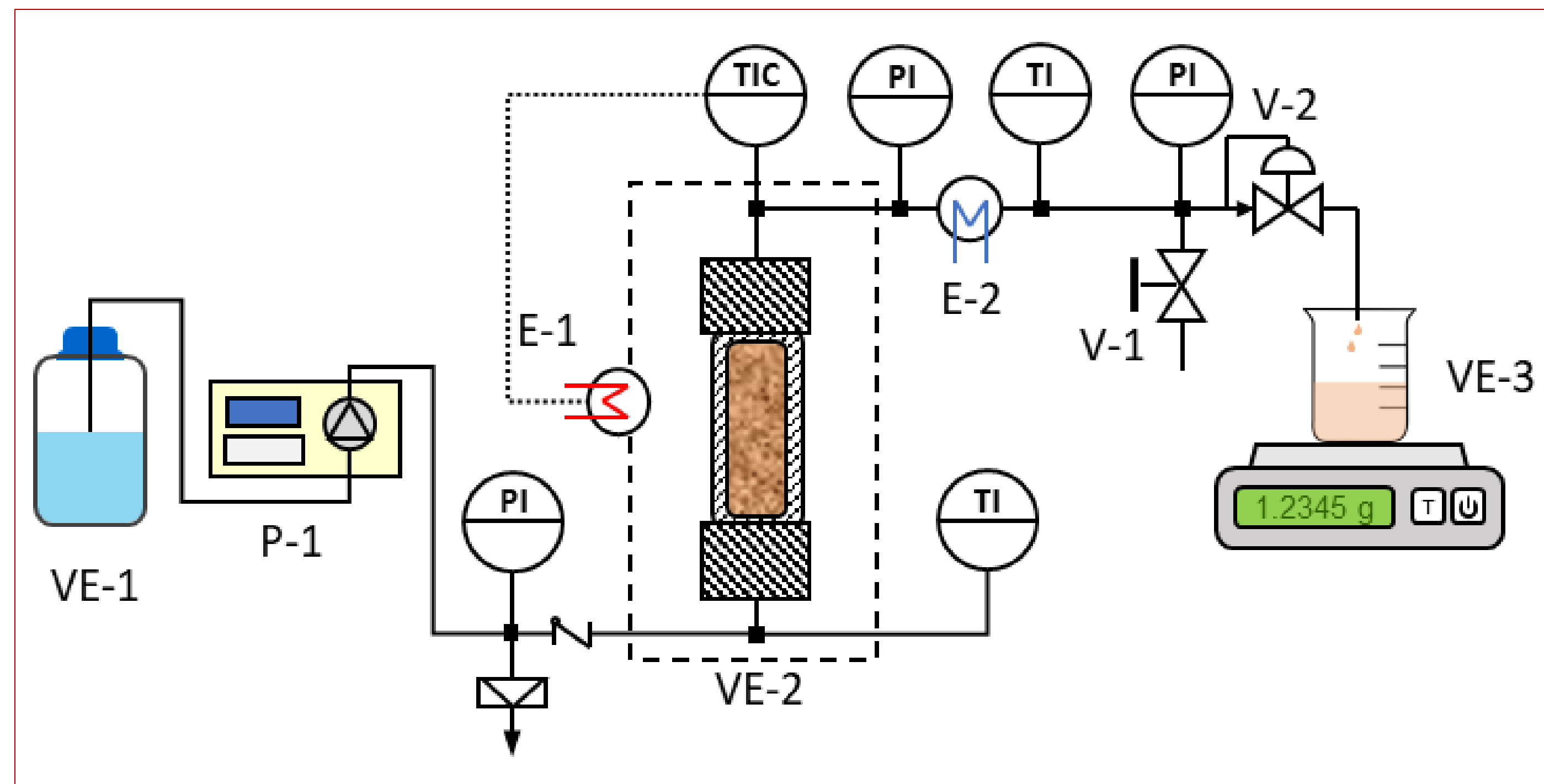
BSG is the most abundant brewing industry by-products (85%). Is a good source of functional ingredients. Offers a great potential to be incorporated within the circular economy concept.



BSG composition, %

50,8 % of BSG amino acids are essential

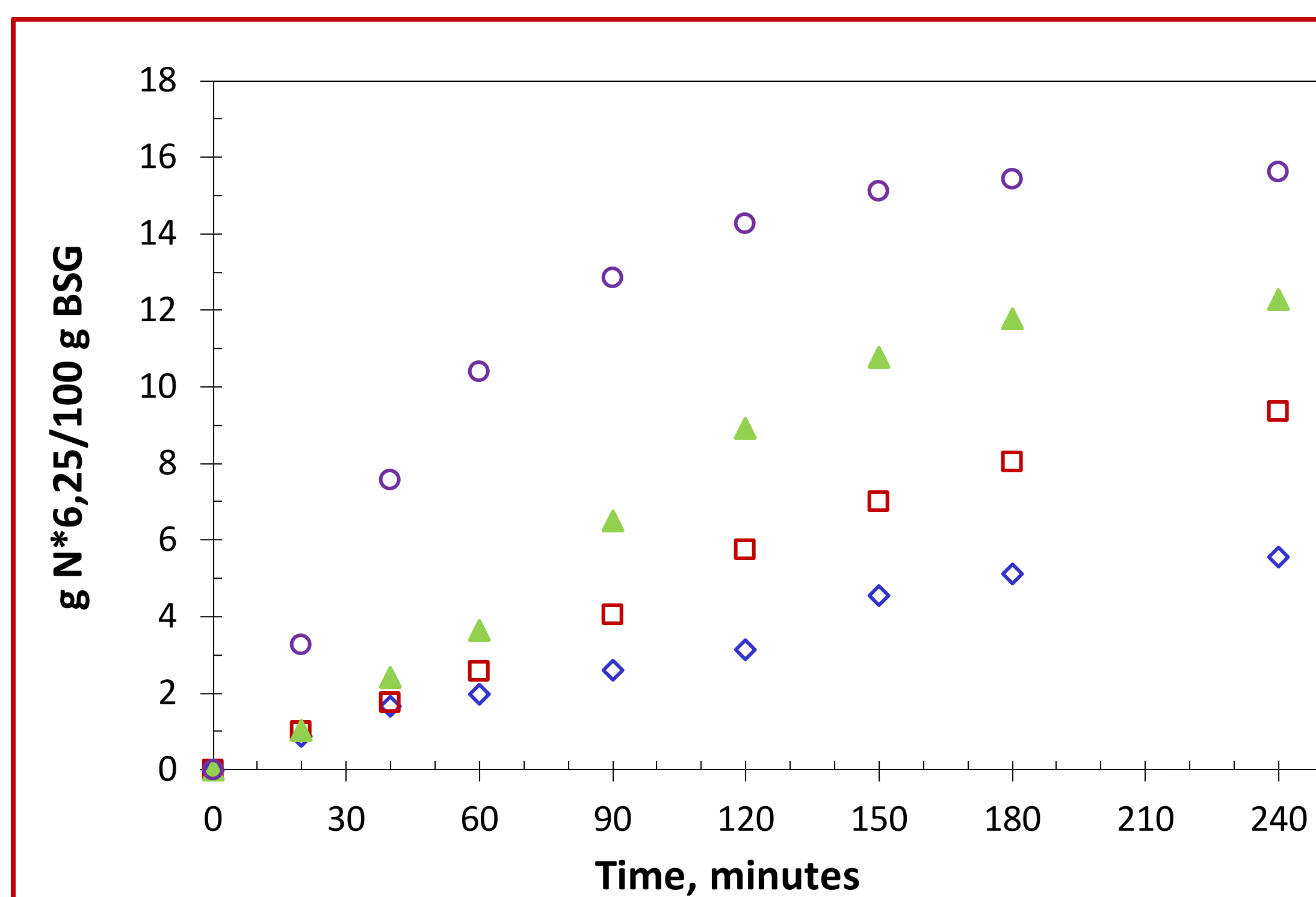
Subcritical water at 50 bar and 4 ml/min in a semicontinuous reactor at different temperatures to extract and hydrolyze BSG proteins.



Operating conditions:

T (°C)	$\rho$ (kg/m <sup>3</sup> )	time, $\tau$ (min)	log(R <sub>0</sub> )	$\rho$ , water density $\tau$ , residence time R <sub>0</sub> , severity factor
125	941.43	29.94	2.21	
145	924.15	29.39	2.79	
160	910.05	28.94	3.23	
185	884.26	28.12	3.95	

Effect of temperature on SWF extracts of BSG.  $\diamond$  125°C,  $\square$  145°C,  $\blacktriangle$  160°C,  $\circ$  185°C

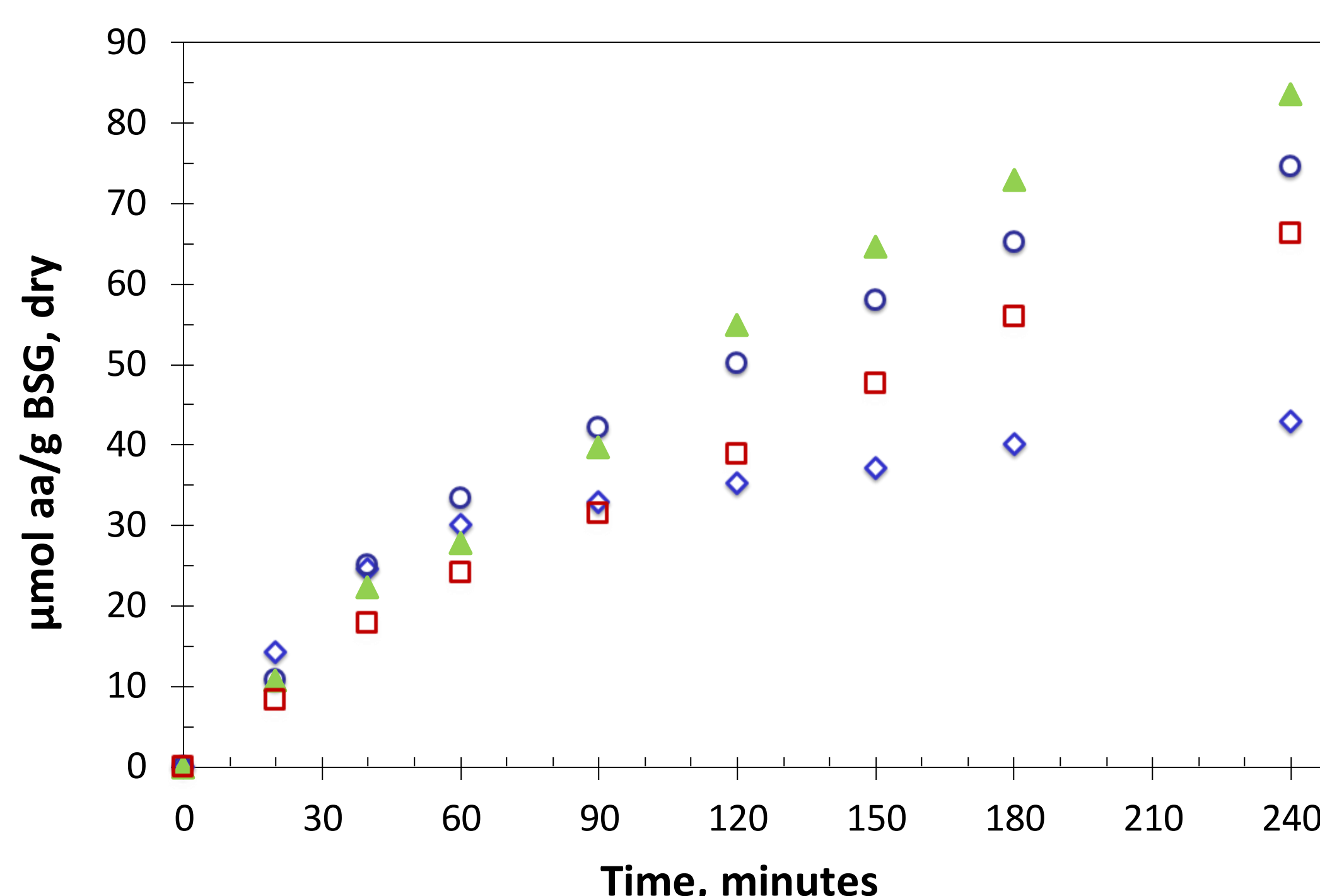


% Total N\*PF accumulated after 240 minutes of extraction

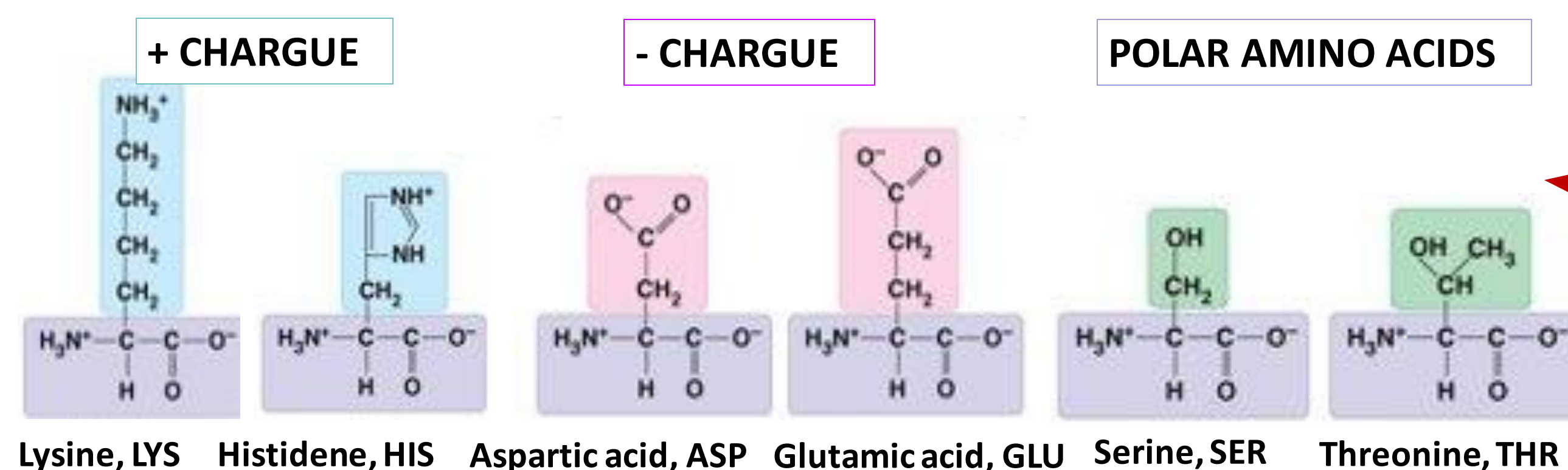
Higher yield at higher T

T, °C	Yield, %
185	87.7
160	69.0
145	52.6
125	31.3

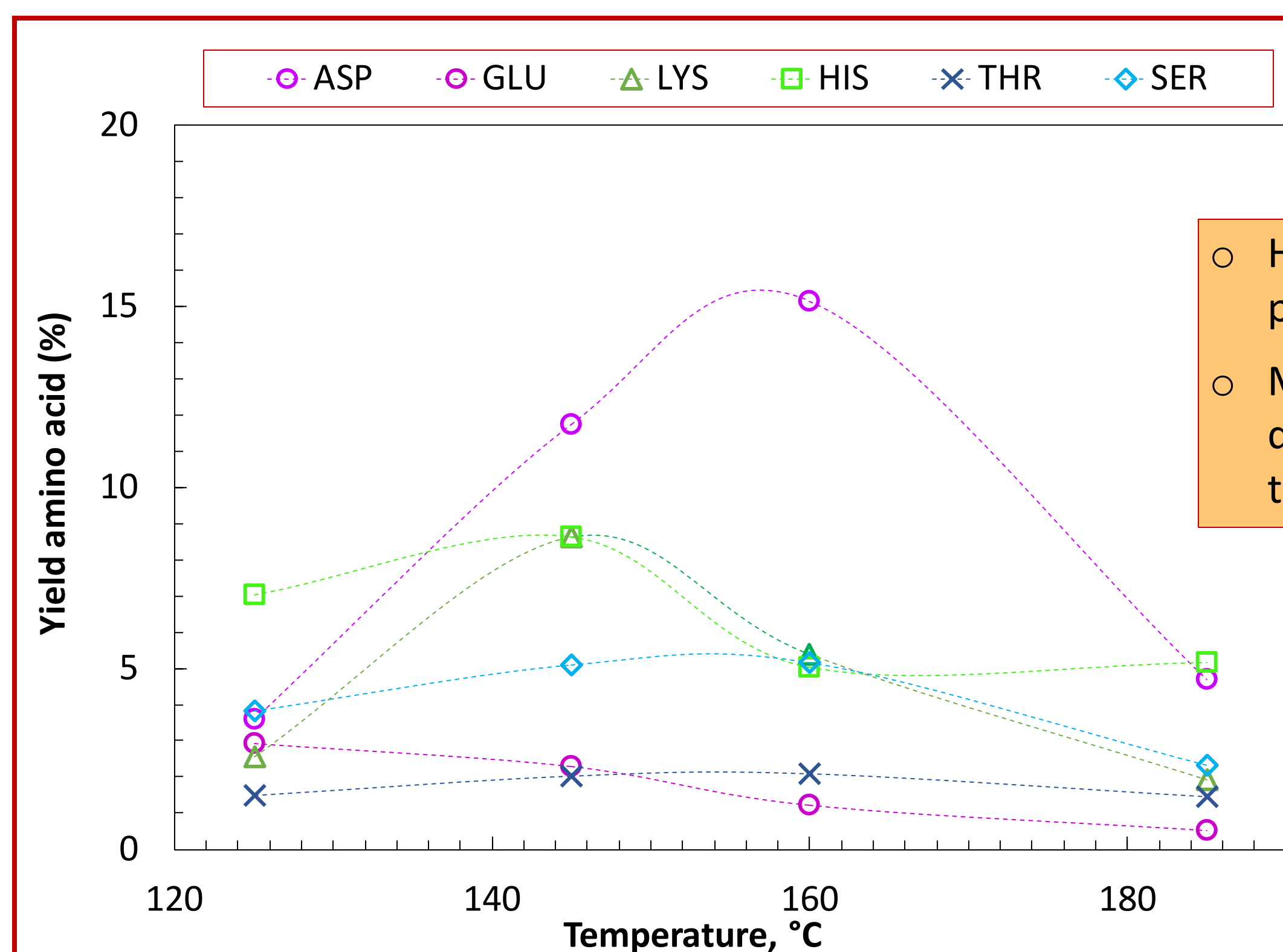
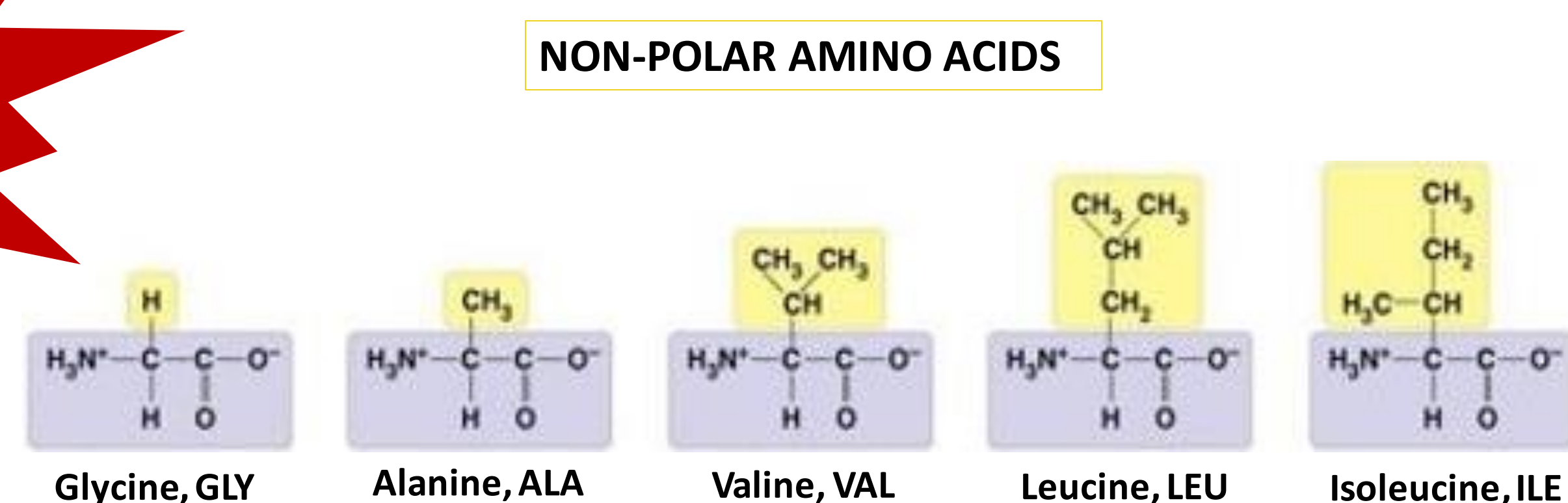
Highest amino acid content at 160°C due to amino acid decomposition at logR<sub>0</sub> > 3.2



Free amino acids as total μmol of each amino acid in dry weight basis



Trend related to the hydrophobicity of each group of aa



Higher yield of charged and polar amino acids at 145-160  
More susceptible to decomposition at elevated temperatures.

Higher yield at higher T  
More stable at higher T  
Decrease of water dielectric constant when the T increase

