Flame Temperature

Facts:	Fuel/oxidant mixture	Maximum Temperature
		K
	Propane – air	2200
	Hydrogen – air	2320
	Acetylene – air	3430
	Cyanogen – air	4900

Use spreadsheet to solve the following cubic equation.

$$22.9 \times 10^{-7}T^3 - 23.14 \times 10^{-3}T^2 - 165.3T + 987100 = 0$$

T is the maximum theoretical temperature achievable during the combustion of C_2H_2 (acetylene) and N_2O (nitrous oxide). The high temperature is required in order to dissociate the injected material into atoms to observe the characteristic atomic emissions – flame emission spectrophotometry (flame test).

Solution: $T = 4400$ (2 s.f). This is theoretical maximum and in practice one gets a lower value than this, about 3230K due to technical reasons but still high enough to warrant using the above mix for high temperature applications.

guess						
2000	**2000**					
	5522.444					
	4035.526					
	4602.263					
	4356.953					
	4459.977					
	4416.036					
	4434.665					
	4426.747					
	4430.109					
	4428.681					
	4429.287					
	4429.03					
	4429.139					
	4429.092					
	4429.112					
	4429.104					
	4429.107					
	4429.106					
	4429.107					
	4429.106					
	4429.106					

Change the guess value in red to investigate the speed of convergence iteratively.