

## Appendix 1 Standard Chemical Exergy T K P 101 325 Kpa

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### Appendix 1 Standard Chemical Exergy

1 APPENDIX 1. STANDARD CHEMICAL EXERGY (Tn= 298.15 K, pn = 101.325 kPa) Source: Szargut, J., Egzergia. Poradnik obliczania i stosowania, Wydawnictwo Politechniki Shlaskej, Gliwice 2007. Substance State Molecular mass Enthalpy of devaluation Standard chemical exergy M, kg/kmol Do, kJ/mol eo x.ch, kJ/mol Al s 26.9815 930.9 795.7

### APPENDIX 1. STANDARD CHEMICAL EXERGY (T K, p 101.325 kPa)

Chemical exergy 1 . CHEMICAL EXERGY. Table 1. Molar exergy,  $\psi_i$ , of pure species relative to a reference atmosphere at p 0=100 kPa, T 0=25 °C, and 60% RH;  $\psi_i = \mu_i(T 0, p 0, 1) - \mu_i^0(T 0, p 0, x_i^0)$ . Substance Formula (state)  $\psi$  Molar fraction in ref. atm. x. i. Molar exergy . i [kJ/mol] Nitrogen N. 2 (g) 0.7651 0.66 Oxygen O. 2 (g) 0.2062 3.9 Water H. 2

### CHEMICAL EXERGY - UPM

APPENDIX 1. STANDARD CHEMICAL EXERGY in Thermodynamics and the Destruction of Resources by Bhavik Bakshi, Timothy Gutowski and Dusan Sekulic, Cambridge University Press, 2011 . Materials Production. Ayres et al, An Application of Exergy Accounting to Five Basic Metal Industries, 2006. Ellingham Diagrams.

### 2.83/2.813 Reading List - Massachusetts Institute of ...

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### Appendix 1 Standard Chemical Exergy T K P 101 325 Kpa

Starting from eq. , the standard molar chemical exergy of the compound “X” at the standard condition (T = 298.15 K and P = 1 atm) is defined as in eq. . (3)  $\epsilon^\circ C_a H_b N_c O_d S_e F_f Cl_g Br_h I_i S_j = \Delta H_f^\circ - T \Delta S_f^\circ + a \epsilon^\circ C + b 2 \epsilon^\circ H_2 + c 2 \epsilon^\circ N_2 + d 2 \epsilon^\circ O_2 + e \epsilon^\circ S + f 2 \epsilon^\circ F_2 + g 2 \epsilon^\circ Cl_2 + h 2 \epsilon^\circ Br_2 + i 2 \epsilon^\circ I_2 + j \epsilon^\circ S_i$

### Standard molar chemical exergy: A new accurate model ...

The standard exergy of a substance can be evaluated by considering an idealized reaction of the substance with other substances (generally reference substances) of known chemical exergies 16. The known chemical exergies can be obtain from the table of standard chemical exergy based on Szargut's R.E model (Model II), as shown in Table 1.

### Estimating the specific chemical exergy of municipal solid ...

Answers for 1 & 2 |S=5 2 "S 1 = 1 T o #\$(E 2 "E 1)"(B 2 "B 1)%&= Q L T L " Q H T H B lost =Q H "Q L +T o|S"W Consider the process in two stages; 1) you transfer heat in, and 2) You transfer heat and work out. Use the result from Carnot to Show that the change in entropy is zero. This leads to the result that The exergy lost is also zero.

### Introduction to the “Exergy” Concept

Definition #1 of Exergy “Exergy is the amount of work obtainable when some matter is brought to a state of thermodynamic equilibrium with the common components of the natural surroundings by means of reversible processes...” [Szargut et al 1988].

### Introduction to the “Exergy” Concept

Appendix 1. Standard chemical exergy. 2007. [30] Querol E, Gonzalez-Regueral B, and Perez-Benedito JL. Practical ap- proach to exergy and thermo-economic analysis of industrial processes. 2013; Springer. [31] Cullen JM, Allwood JM, Borgstein EH. Reducing Energy Demand : What Are the Practical Limits? Environ Sci Technol. 2011;45:17118. [32]

### Unlocking Plant-level Resource Efficiency Options: A ...

Fe (c = 1) 376.4 kJ/mole reduction Fe 2O3 (c=1) 16.5 kJ/mole extraction Fe 2O3(c = 1.3 x 10-3) 0 kJ/mole (ground)

### Introduction to the concept of available work and exergy

Standard chemical exergy and standard entropies of various compounds. Substance e 0 (kJ/mol) s 0 (kJ/mol K) ... (Appendix 1). These data cover six categories of . combustible MSW fractions, namely ...

### (PDF) Estimating the specific chemical exergy of municipal ...

Standard chemical exergy values, in units of kJ/kmol, are based on a standard exergy reference environment with To and Po such as 298.15 K (536.67 R) and 1 atm, respectively, and consisting of a set of reference substances with standard concentrations of gaseous, liquid and solid components.

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Standard chemical exergy of a substance. The chemical exergy of a substance is equal to the maximum amount of work that can be obtained from the substance by taking it to chemical equilibrium with the reference environment .

### Estimating the specific chemical exergy of municipal solid ...

subatomic particles prevents a standard exergy for each nuclide in a form similar to chemical species standard exergy. Nuclides have specific bound energies [7] following a curve rising on either side of the atoms in the iron family of the periodic table as shown in Fig. 1. Bound energy is proportional to the mass difference between a

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1.013 bar. Standard chemical exergy values of the main substances were. obtained using the model of Szargut [43]. ... simulation of the plant can be found in the Appendix A of the paper.

### (PDF) Exergy and Economic Evaluation of a Hybrid Power ...

The specific chemical exergy can also be calculated using Eq. (Mehrpooya and Mousavi, 2018): (27)  $e_{c,h} = \sum x_i e_{i,0} + G - \sum x_i G_i$  where  $x_i$ ,  $e_{i,0}$ , and  $G$  are the mole fraction, standard chemical exergy of component  $i$  for an ideal mixture, and the Gibbs free energy. Exergy balance around the device, under steady state conditions can be ...

### Batch-to-continuous process design and economic, energy ...

of universal and comprehensive formulations of the chemical exergy reference environment, for the purpose of better understanding how exergy can inform decision-making. Four related insights emerged from the analysis, notably: (1) standard and universal chemical exergy reference environments necessarily encounter internal inconsistencies and even

### The Characteristics of the Exergy Reference Environment ...

The exergy loss ratio is calculated as : (11)  $E_{l,0} s_s = T_0 \int y dx e_f$  where  $e_f$  is the initial chemical exergy carried by the mixture, defined as the product between the standard chemical exergy per unit mass of the unburned mixture (see Appendix B for details), the density of the unburned mixture and the laminar flame speed: (12)  $e_f \dots$

### Second law thermodynamic analysis of syngas premixed ...

@article{osti\_6157620, title = {Exergy analysis of thermal, chemical, and metallurgical processes}, author = {Szargut, J and Morris, D R and Steward, F R}, abstractNote = {This important new text demonstrates exergy applications in ecology, economics, and industry. In fact, it constitutes the very first presentation of the vast possibilities of important ecological applications of exergy analysis.