ing the same TAN to a private record as is used in a CAS file,[2] or giving an inappropriate file name

The present system, TSIR-1, is designed to be such a system for the scientific community at the University of Tokyo. In the system, STF records are generated by the on-line input described above, by a tape-to-tape conversion process of SDF tapes, and by the retrieval of large-scale STF files on the 'current awareness' basis. The programs described above were developed for use as commands in the system. As a typical Japanese user is not expected to be a good typist, the programs were made to work with as simple input from the user as is compatible with flexibility of its functions. For the same reasons, numbers '1' and '0', rather than 'YES', 'NO' or 'Y', 'N', were requested as the affirmative and the negative responses from the user.

The programs have been successfully used by several TSS users as their private programs, and the data files thus generated within their TSS files have been used for on-line generation of KWIC indexes of both English and Japanese title data elements. The programs will be registered as commands in the system in the near future.

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Reference Literature to Thermodynamic Diagrams

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A review of the sources of published thermodynamic diagrams which are frequently used by engineers in research and industry is presented.

Thermodynamic diagrams, such as pressure-enthalpy (p-H), temperature-entropy (T-S), enthalpy-entropy (H-S), volume-enthalpy (v-H), and temperature-enthalpy (T-H) are frequently used by engineers in design calculations, particularly for compressors, refrigerators, and power cycles (Rankine, Carnot, etc.). Several diagrams are available in various textbooks; however, a review of the published charts will assist engineers to a quick and easy selection according to the requirements. This article is based mainly on secondary sources (textbooks), which are available in most technical libraries. In most cases, the original diagram is presented in an enlarged form with an accordingly higher accuracy, which is always required by these types of calculations.

Tables I and II list single inorganic and organic substances arranged in alphabetical order by chemical formula, thus providing a quick method for finding a given compound in the tabulations. The numbers refer to the

Table I. Inorganic Compounds

Formula	Name	Refrigerant No.	References
A	Argon	740	1b,7b,18b,23c,36ace
—	Air	729	1b,7b,18b,23b,24ce,25a, 26a,36ace
CO	Carbon monoxide	728A	5a,7b,13b,18ab,23c
CO_2	Carbon dioxide	744	1a,5a,7b,18b,19a,23bc, 24a,25a,26a,37abc
Cl_2	Chlorine	771	15ab,18a,28b
H_2	Hydrogen (normal)	702n	1b,5a,18b,23bc
H_2	Hydrogen (para)	702p	1bc,30b
H_2O	Water	718	5a,9d,16c,17t,18bc,23c, 24c,26bc,27t,31ct,33t
He	Helium	704	1bc,18bc,23b,39a
Hg	Mercury	900	23c
K	Potassium	739	23c
N_2	Nitrogen	728	1b,5a,7b,18b,23b,36ace, 39a
NH_3	Ammonia	717	1a,5a,7b,9a,14a,18b,19a, 24a,25a,26a,39a
N_2O	Nitrous oxide	744A	23c,24a,25a,26a
Na	Sodium	723	23c
Ne	Neon	720	1b
O_2	Oxygen	732	1b,5a,18a,36ace
SF_6	Sulfur hexafluoride	846	18ab
SO_2	Sulfur dioxide	764	5a,24a,25a,26a

Table II. Single Organic Compounds

Formula	Name	Refrigerant No.	References
$CBrClF_2$	Methane, bromochlorodifluoro-	12B1	2a,22a
$CBrF_3$	Methane, bromotrifluoro-	13B1	1a,18b
$CBrH_3$	Methyl bromide	40B1	18a
CCl_4	Carbon tetrachloride	10	29b
CCl_3F	Methane, fluorotrichloro-	11	1a,6a,24a,25a,26a
CCl_2F_2	Methane, dichlorodifluoro-	12	1a,9ad,11a,19a,23a, 24a,25a,26a
$CClF_3$	Methane, chlorotrifluoro-	13	1a,24a,25a
CCl_2FH	Methane, dichlorofluoro-	21	24a,25a,26a
$CClF_2H$	Methane, chlorodifluoro-	22	1a,24a,25a,26a
CCl_2H_2	Methylene chloride	30	8b,18b
$CClH_3$	Methyl chloride	40	12ce,24a,25a,26a
CF_4	Methane, tetrafluoro-	14	1a
CF_3H	Methane, trifluoro-	23	1a
CH_4	Methane	50	1a,5a,7b,18b,21c,23b, 25a,26a,34cf,35b
C_2BrH_5	Ethyl bromide	160B1	18b
$C_2BrF_3H_2$	Ethane, 1-bromo-2,2,2-trifluoro-	133B1	3a
$C_2Cl_3F_3$	Ethane, 1,1,2-trichloro-1,2,2,-trifluoro-	113	1a,25a,26a
$C_2Cl_2F_4$	Ethane, 1,2-dichloro-1,1,2,2-tetrafluoro-	114	1a,20a,24a,25a,26a, 38c
C_2ClF_5	Ethane, chloropentafluoro-	115	1a
$C_2ClF_2H_3$	Ethane, 1-chloro-1,1-difluoro-	142b	1a,4a
$C_2Cl_2H_2$	Ethene, trans-1,2-dichloro-	1130t	18b
$C_2Cl_2H_2$	Ethene, cis-1,2-dichloro-	1130c	18b
C_2ClH_5	Ethyl chloride	160	18b
$C_2F_3H_3$	Ethane, 1,1,1-trifluoro-	143a	18ab
$C_2F_2H_4$	Ethane, 1,1-difluoro-	152a	1a
C_2H_2	Acetylene	2130	5a,7b,18b
C_2H_4	Ethylene	170	1a,5a,7b,18ab,21c, 24a,25a,26a,34cf
$C_2Cl_2F_6$	Propane, 2,2-dichloro-1,1,1,3,3,3-hexafluoro-	216	1a
C_3H_6	Propylene	1270	1a,5a,18a,21c,25a, 26a,34cf
C_3H_8	Propane	290	1a,5a,7b,18bc,21c, 24a,25a
C_3H_6O	Acetone	—	10a,18a
C_3H_8O	Propanol	—	10a,18a
C_4F_8	Octafluorocyclobutane	C318	1a,24a
C_4H_8	1-Butene	390	5a,34f
C_4H_8	Propene, 2-methyl-	390a	34f
C_4H_8	2-Butene, cis-	390c	34f
C_4H_8	2-Butene, trans-	390t	34f
C_4H_{10}	Butane	600	1a,5a,18ac,21c,25a,26a, 34f
C_4H_{10}	Propane, 2-methyl-	600a	1a,5a,18ac,34f
C_4H_8O	2-Butanone	—	10a,18a
$C_4H_{10}O$	Butanol	—	18a,23b
$C_4H_{10}O$	Diethyl ether	610	10a,24a
C_5H_{12}	Pentane	—	5a,34f,39a
C_5H_{12}	Butane, 2-methyl-	—	34f
C_6H_6	Benzene	C570	5a,18a,34f
C_6H_{12}	Cyclohexane	C5130	34f
C_6H_{14}	Hexane	—	5a,18a,34f
$C_6H_{18}O$	Ether, di-(2-methyl)propylene-	—	10a
C_7H_8	Toluene	C690	34f
C_7H_{16}	Heptane	—	34f
C_8H_{18}	Octane	—	34f

cited literature source; the following letter(s) after the numbers indicate the type of available diagram(s):

a = pressure-enthalpy
b = temperature-entropy
c = enthalpy-entropy (Mollier)
d = volume-enthalpy
e = volume-pressure
f = temperature-enthalpy
t = tables only.

Table III tabulates azeotropic mixtures chiefly used in refrigeration processes. These mixtures are tabulated by increasing refrigerant number.

Table III. Azeotrope Mixtures

Refrigerant No.	Composition	References
500	73.8 wt % CCl_2F_2 + 26.2 wt % CH_3CHF_2	1a
501	75.0 wt % $CHClF_2$ + 25.0 wt % CCl_2F_2	—
502	48.8 wt % $CHClF_2$ + 51.2 wt % $CClF_2CF_3$	1a,18a
503	59.9 wt % $CClF_3$ + 40.1 wt % CF_3H	1a,18a
504	48.2 wt % CF_2H_2 + 51.8 wt % CF_3CF_2H	1a

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