

Table S1. Data of dimethyl ether, isobutane and propane.

			Dimethyl ether				Isobutane				Propane			
			Sim-I	Sim-II	Sim-III	Exp.	Sim-I	Sim-II	Sim-III	Exp.	Sim-I	Sim-II	Sim-III	Exp.
coefficient of performance	COP	(-)	5.44	6.33	6.19	5.46	5.47	5.93	5.73	4.96	5.30	5.67	5.35	5.38
rejected heat flow rate	$\dot{Q}_H$	kW	-	4.17	4.25	3.71	-	2.73	2.69	2.40	-	5.59	5.22	5.10
compressor power	P_{com}	kW	-	0.66	0.69	0.68	-	0.46	0.47	0.48	-	0.99	0.97	0.95
evaporation temperature	T_{ev}	°C	9.89	8.87	10.00	9.26	9.89	11.23	12.00	12.06	9.89	6.56	6.50	7.33
compressor inlet temperature	T_1	°C	14.89	13.49	13.18	14.22	14.89	15.11	15.80	14.10	14.89	15.47	16.73	8.17
pressure loss evaporator	Δp_{ev}	kPa	-	-	15.54	24.07	-	-	16.64	20.78	-	-	56.81	52.66
condensation temperature	T_c	°C	34.51	34.52	35.50	34.13	34.51	34.72	36.50	34.58	34.51	34.24	35.99	34.39
subcooling condenser outlet	$\Delta T_{subcooling}$	K	2.11	2.11	7.09	1.16	2.11	2.11	9.46	2.78	2.11	2.11	9.55	2.08
pressure loss condenser	Δp_c	kPa	-	-	4.49	15.25	-	-	2.79	12.70	-	-	5.00	15.93
specific heat (condenser)	q_H	$\text{kJ}\cdot\text{kg}^{-1}$	-	438.55	457.48	453.70	-	353.55	380.48	366.03	-	374.52	410.64	378.75
compressor pressure ratio	p_2/p_1	(-)	2.43	2.14	2.21	2.29	2.45	2.01	2.21	2.19	2.18	2.07	2.40	2.27
isentropic compressor efficiency	η_{com}^s	(-)	0.47	0.53	0.53	0.54	0.47	0.45	0.47	0.46	0.47	0.53	0.57	0.52
specific compressor work	w_{com}	$\text{kJ}\cdot\text{kg}^{-1}$	-	70.15	74.27	76.91	-	60.49	66.48	66.77	-	67.14	76.72	75.80
refrigerant mass flow rate	$\dot{m}$	$\text{g}\cdot\text{s}^{-1}$	-	9.39	9.29	8.33	-	7.62	7.07	6.61	-	14.68	12.68	13.68

Table S2. Data of propene, R134a and R152a.

			Propene				R134a				R152a			
			Sim-I	Sim-II	Sim-III	Exp.	Sim-I	Sim-II	Sim-III	Exp.	Sim-I	Sim-II	Sim-III	Exp.
coefficient of performance	COP	(-)	5.25	5.09	4.85	4.64	5.35	5.35	5.31	4.76	5.40	5.67	5.35	5.38
rejected heat flow rate	$\dot{Q}_H$	kW	-	5.59	5.22	5.10	-	4.63	4.61	3.85	-	4.40	4.26	3.64
compressor power	P_{com}	kW	-	1.10	1.08	1.10	-	0.87	0.87	0.81	-	0.73	0.72	0.72
evaporation temperature	T_{ev}	°C	9.89	0.67	1.50	2.17	9.89	8.37	10.00	9.89	9.89	8.56	10.00	9.86
compressor inlet temperature	T_1	°C	14.89	15.57	16.81	17.15	14.89	15.57	10.61	9.94	14.89	13.48	13.71	13.43
pressure loss evaporator	Δp_{ev}	kPa	-	-	68.58	56.09	-	-	34.63	64.65	-	-	25.91	37.71
condensation temperature	T_c	°C	34.51	33.78	35.50	34.26	34.51	34.17	36.50	34.51	34.51	34.64	35.50	34.18
subcooling condenser outlet	$\Delta T_{subcooling}$	K	2.11	2.11	9.41	2.62	2.11	2.11	9.87	2.11	2.11	2.11	5.02	2.39
pressure loss condenser	Δp_c	kPa	-	-	4.20	18.45	-	-	8.28	21.56	-	-	6.36	16.92
specific heat (condenser)	q_H	$\text{kJ} \cdot \text{kg}^{-1}$	-	394.23	429.39	403.67	-	200.32	208.6	205.00	-	309.13	320.06	321.88
compressor pressure ratio	p_2/p_1	(-)	2.15	2.40	2.74	2.56	2.50	2.21	2.43	2.56	2.49	2.21	2.32	2.38
isentropic compressor efficiency	η_{com}^s	(-)	0.47	0.59	0.62	0.64	0.47	0.45	0.48	0.47	0.47	0.52	0.53	0.50
specific compressor work	w_{com}	$\text{kJ} \cdot \text{kg}^{-1}$	-	78.65	88.59	78.66	-	38.02	39.37	42.91	-	52.02	54.09	58.47
refrigerant mass flow rate	$\dot{m}$	$\text{g} \cdot \text{s}^{-1}$	-	13.69	12.16	12.35	-	22.79	22.10	19.00	-	14.06	13.31	11.52